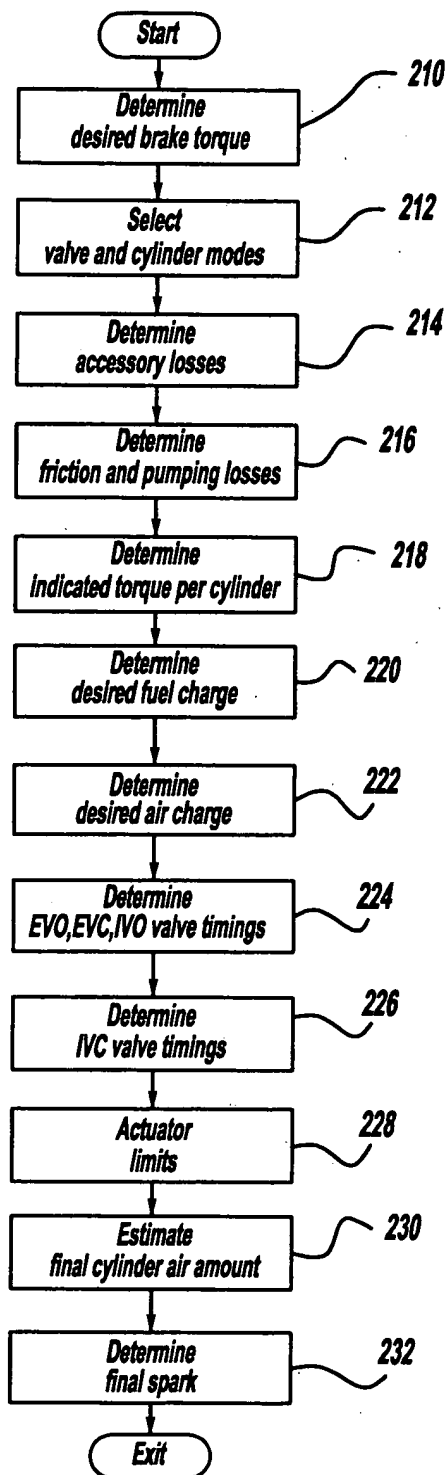
**FIG-1**

**FIG - 2**

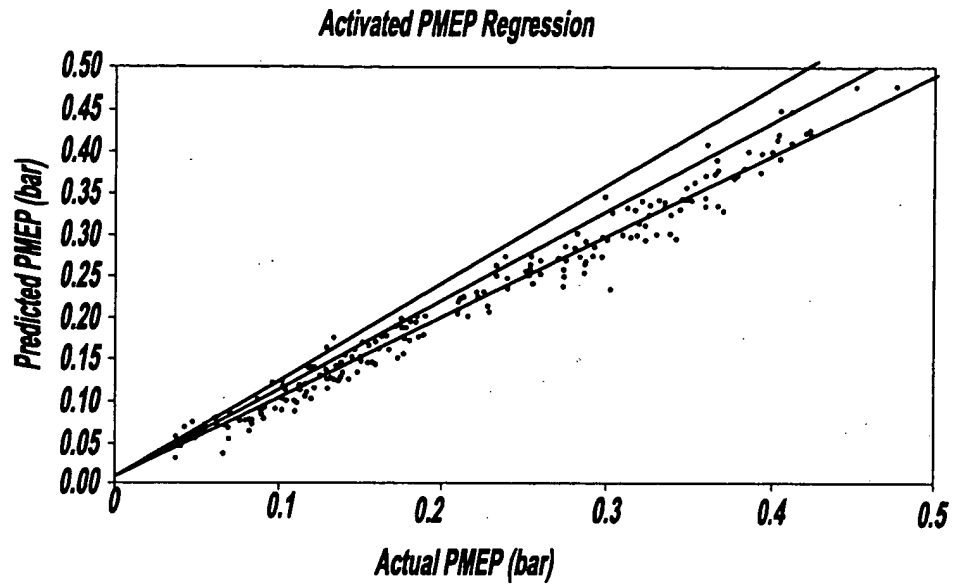


FIG - 3

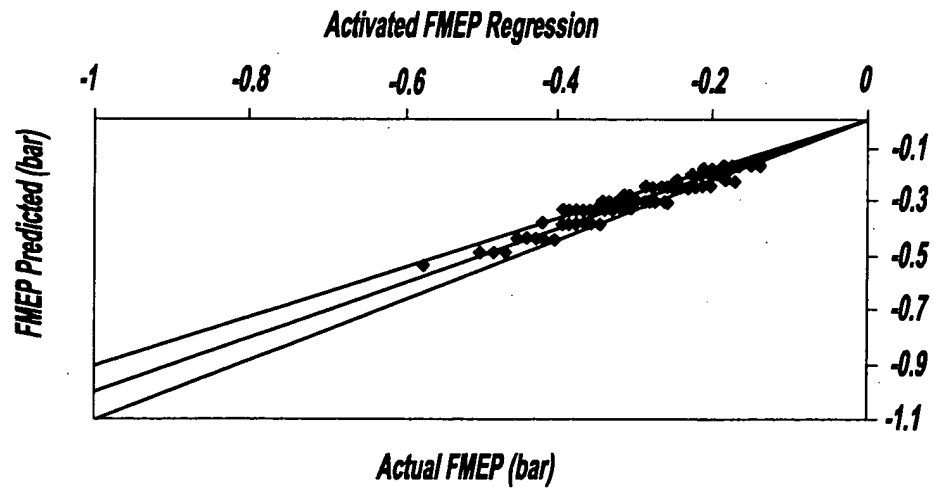
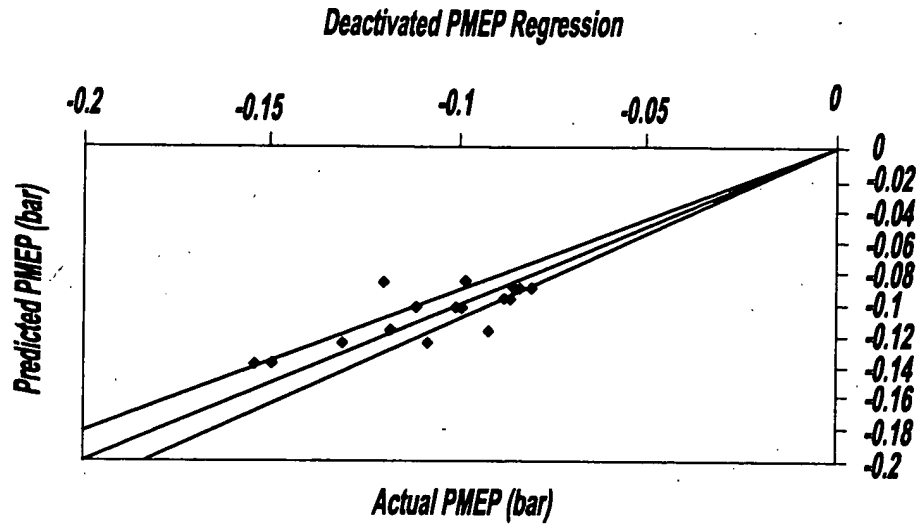
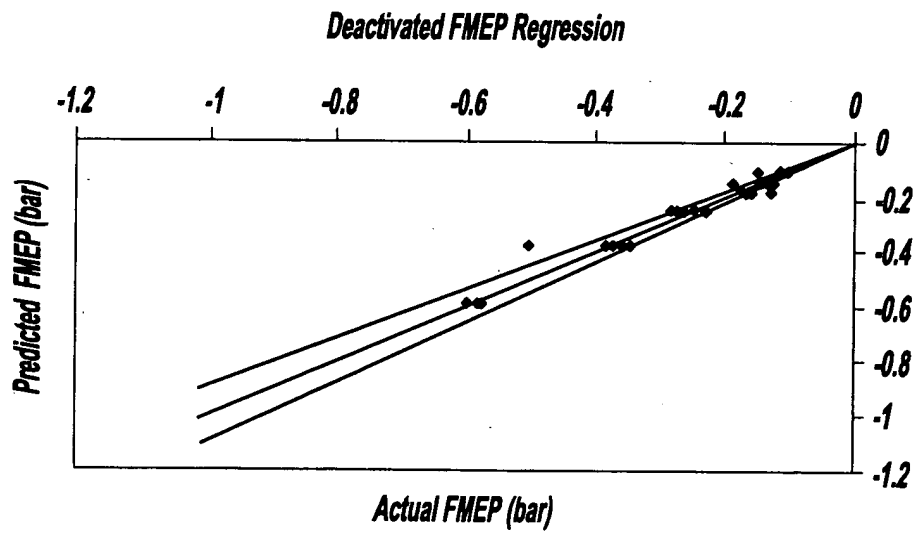
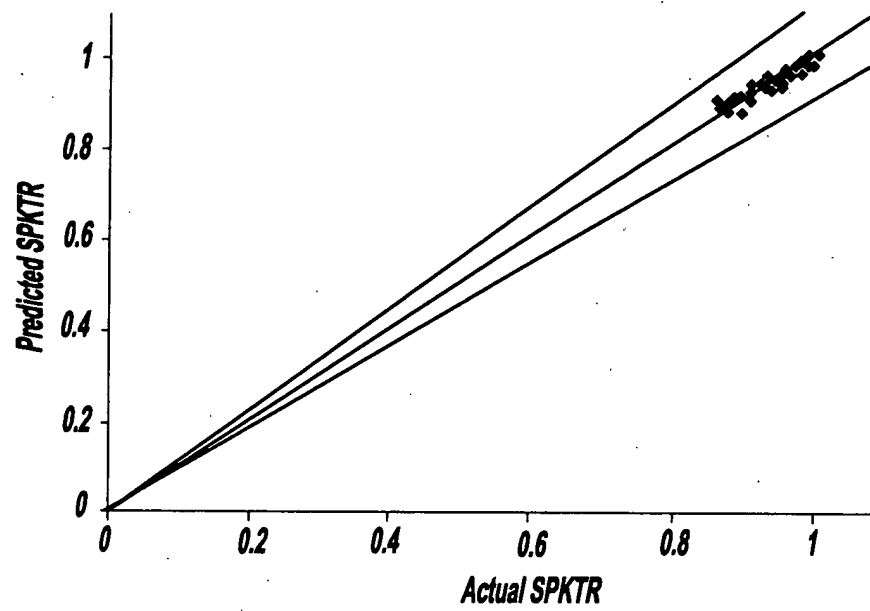
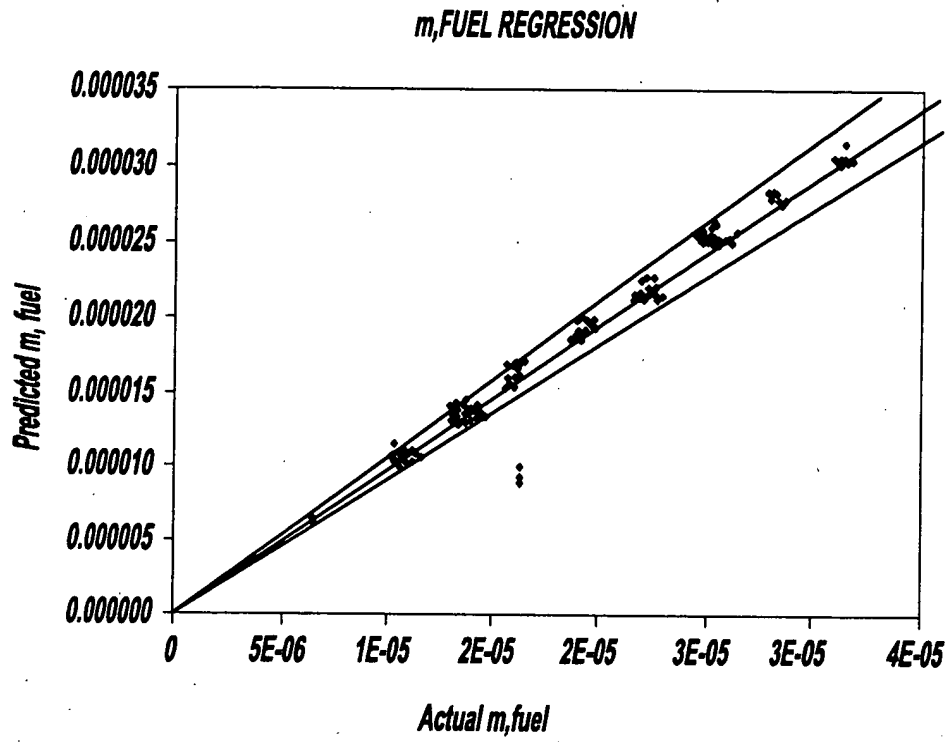


FIG - 4

**FIG - 5****FIG - 6**

Spark Retard Torque Reduction Regression**FIG - 7**

**FIG - 8**

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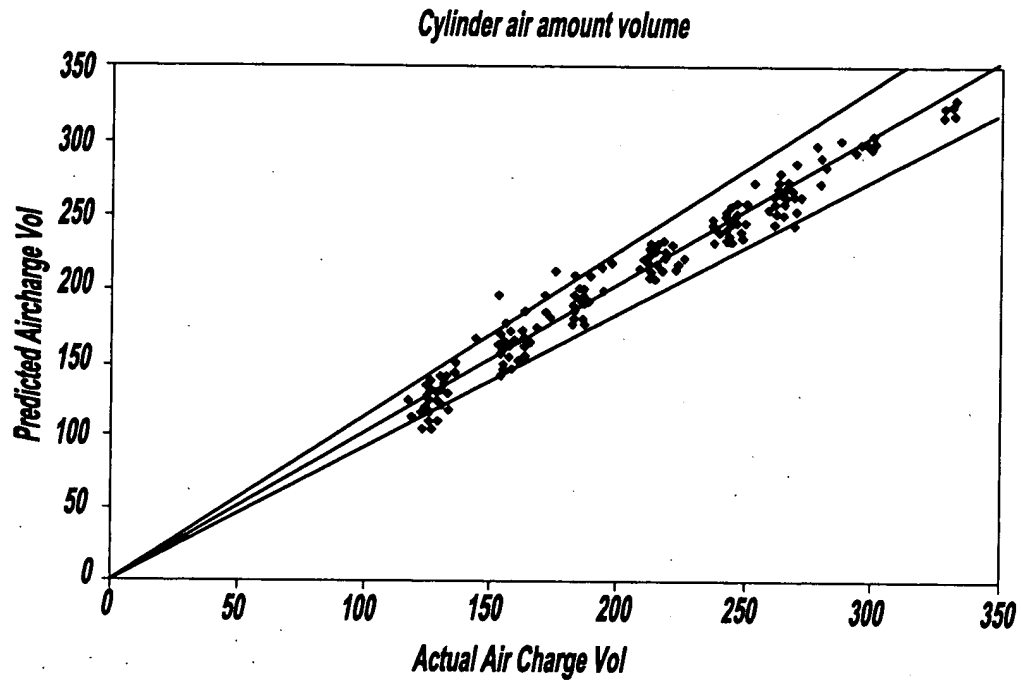
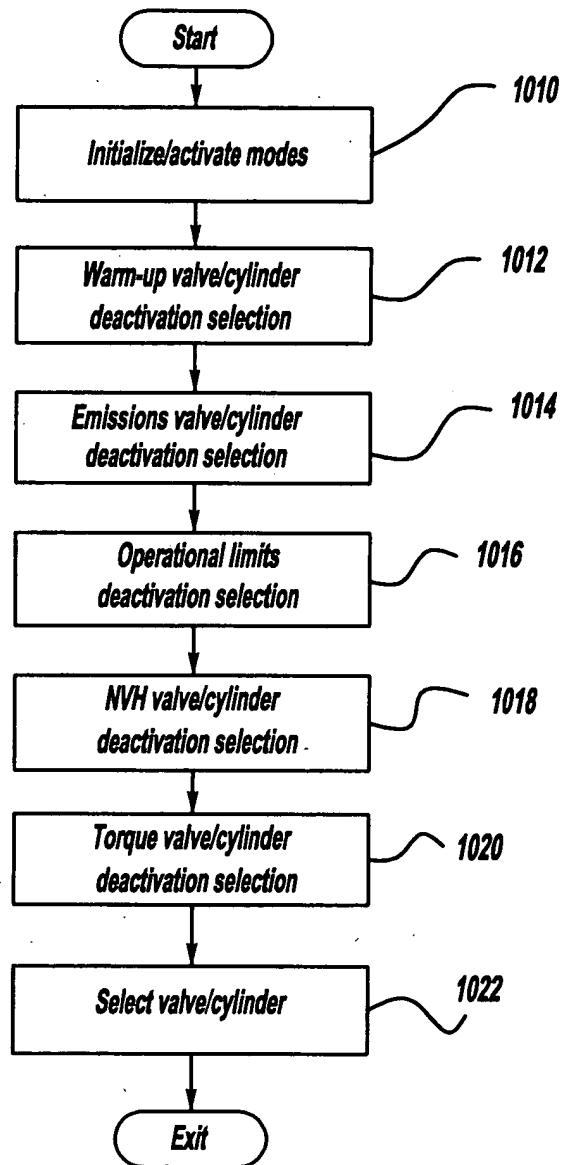


FIG - 9

**FIG - 10**

COLUMN 0 COLUMN 3

0 3

↑ DECREASING TORQUE

12-STROKE

V2	1	1	1	1	ROW 3
	1	1	1	1	
V4	1	1	1	1	
V8	1	1	1	1	ROW 0

DIDE DIAE AIDE AIAE

→ DECREASING TORQUE →

FIG - 11

COLUMN 0 COLUMN 3

0 3

↑ DECREASING TORQUE

12-STROKE

V2	0	0	0	0	ROW 3
	0	0	0	0	
V4	1	1	0	0	
V8	1	1	1	1	ROW 0

DIDE DIAE AIDE AIAE

→ DECREASING TORQUE →

FIG - 12

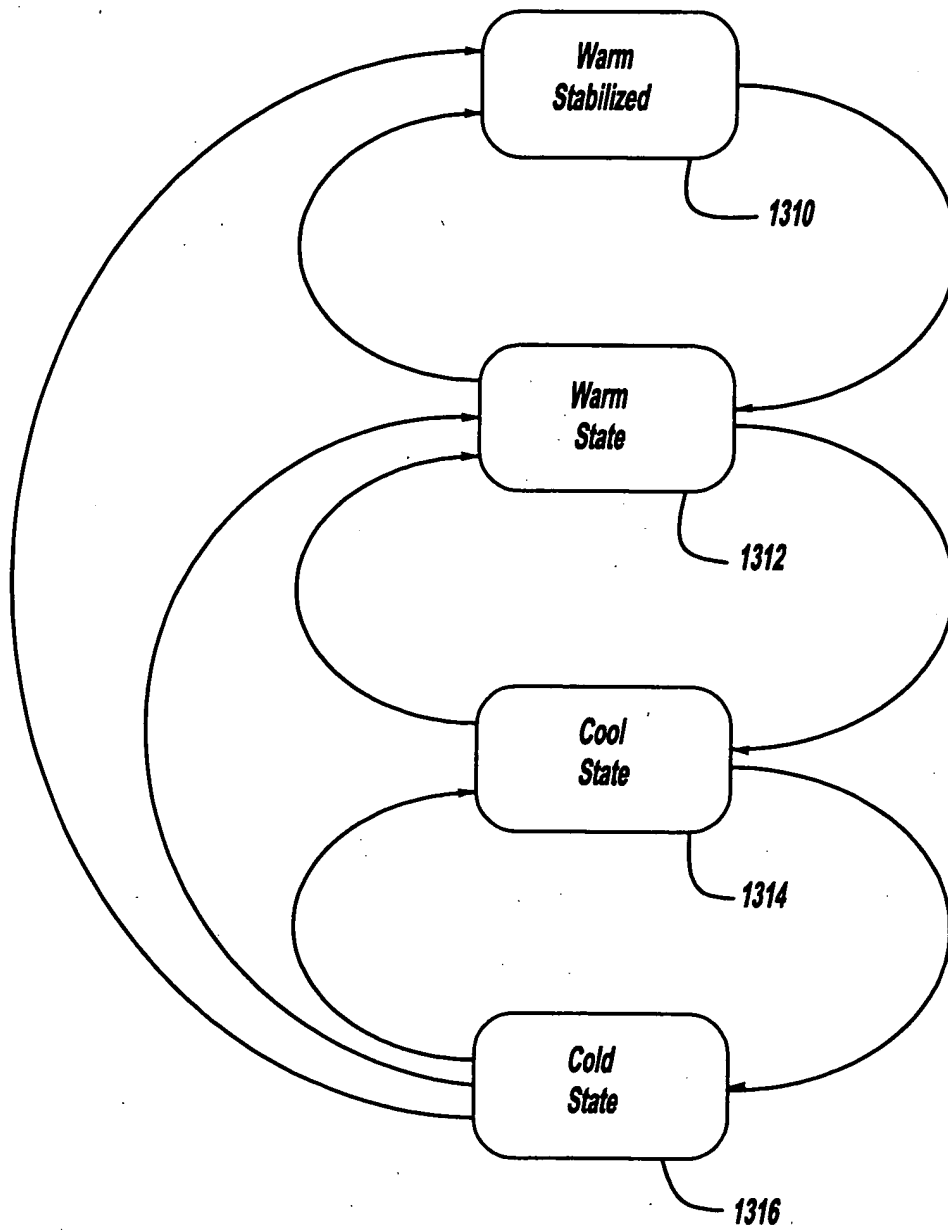


FIG - 13

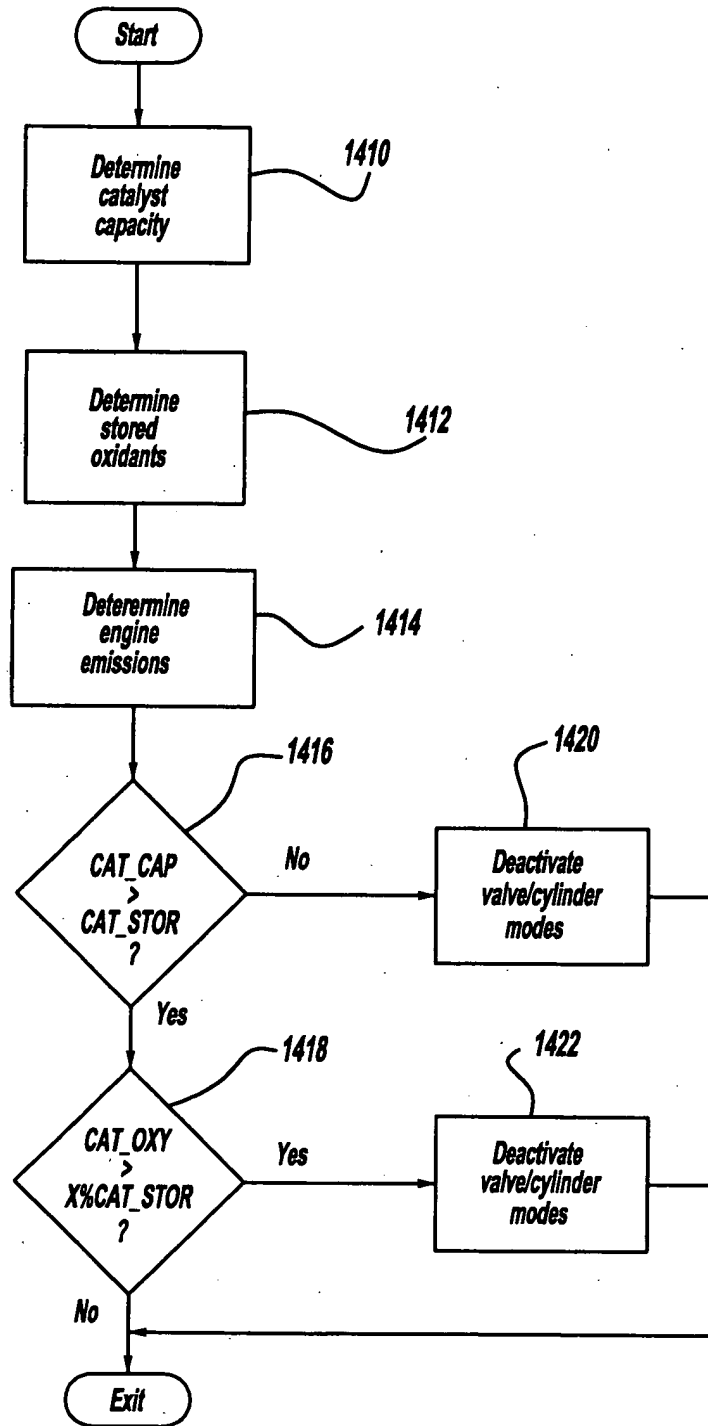
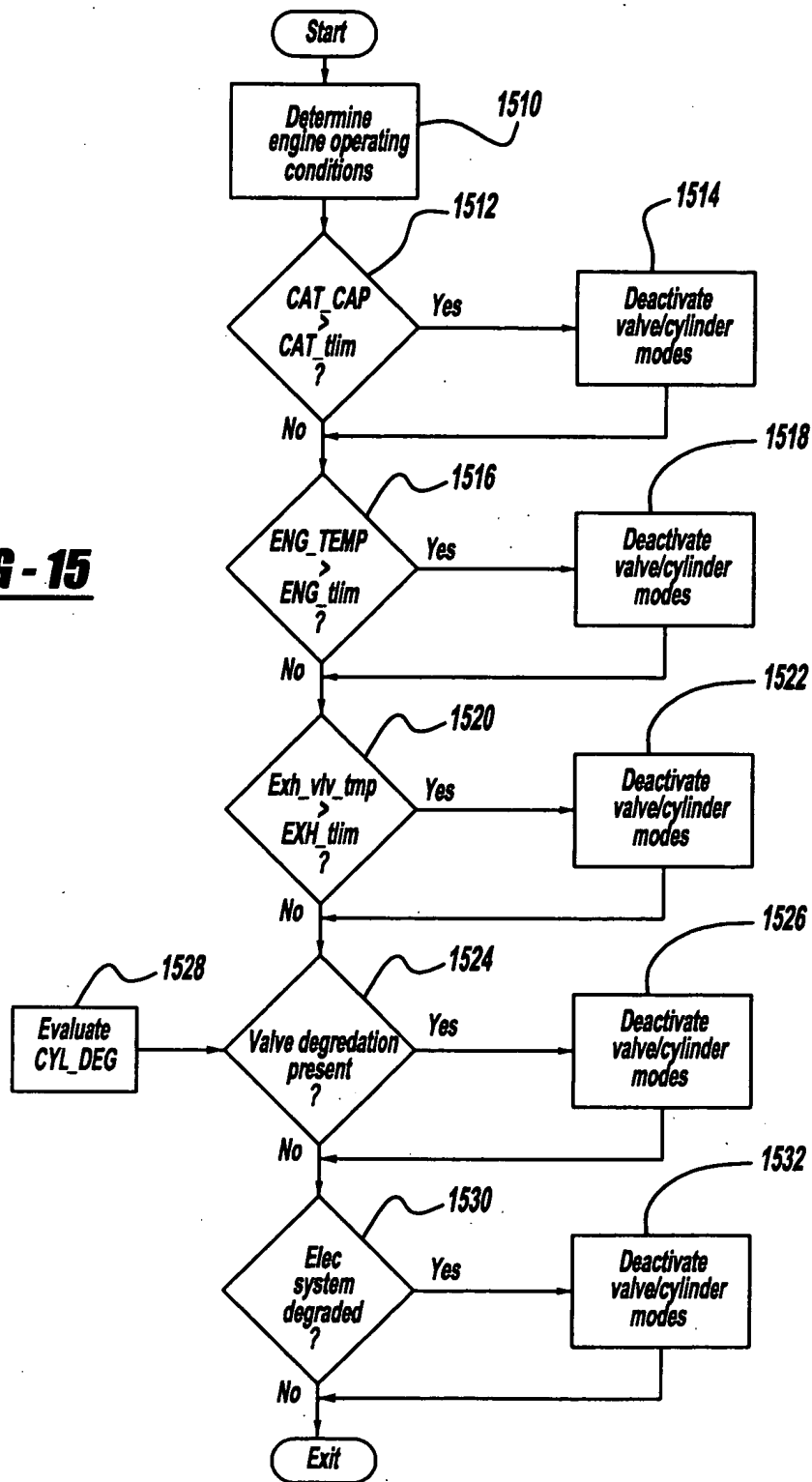
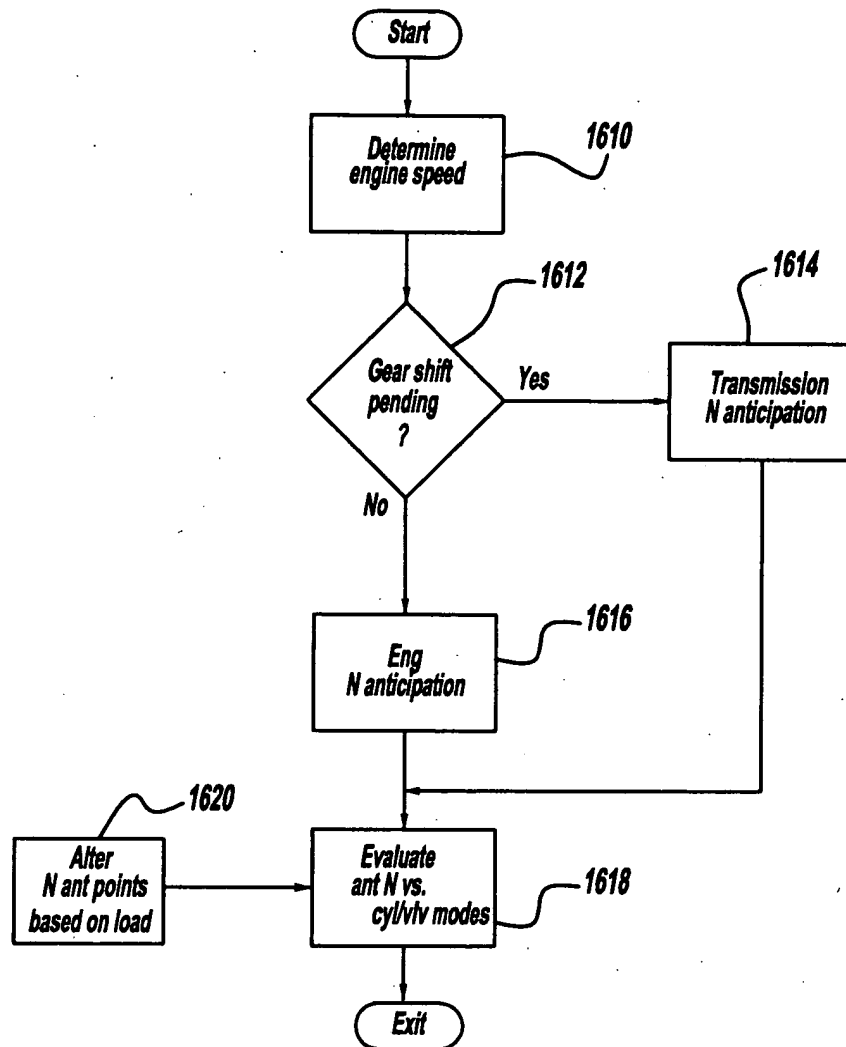
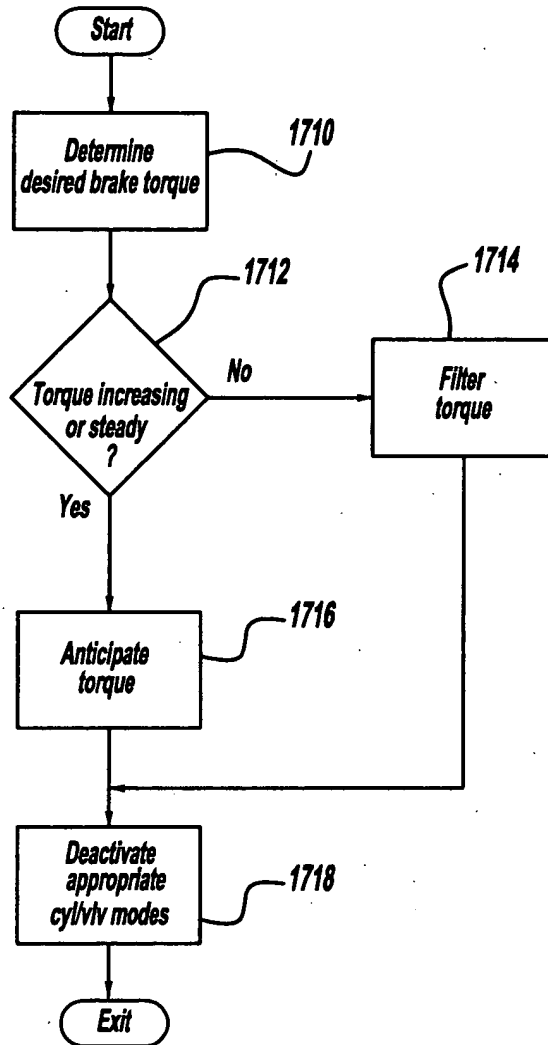
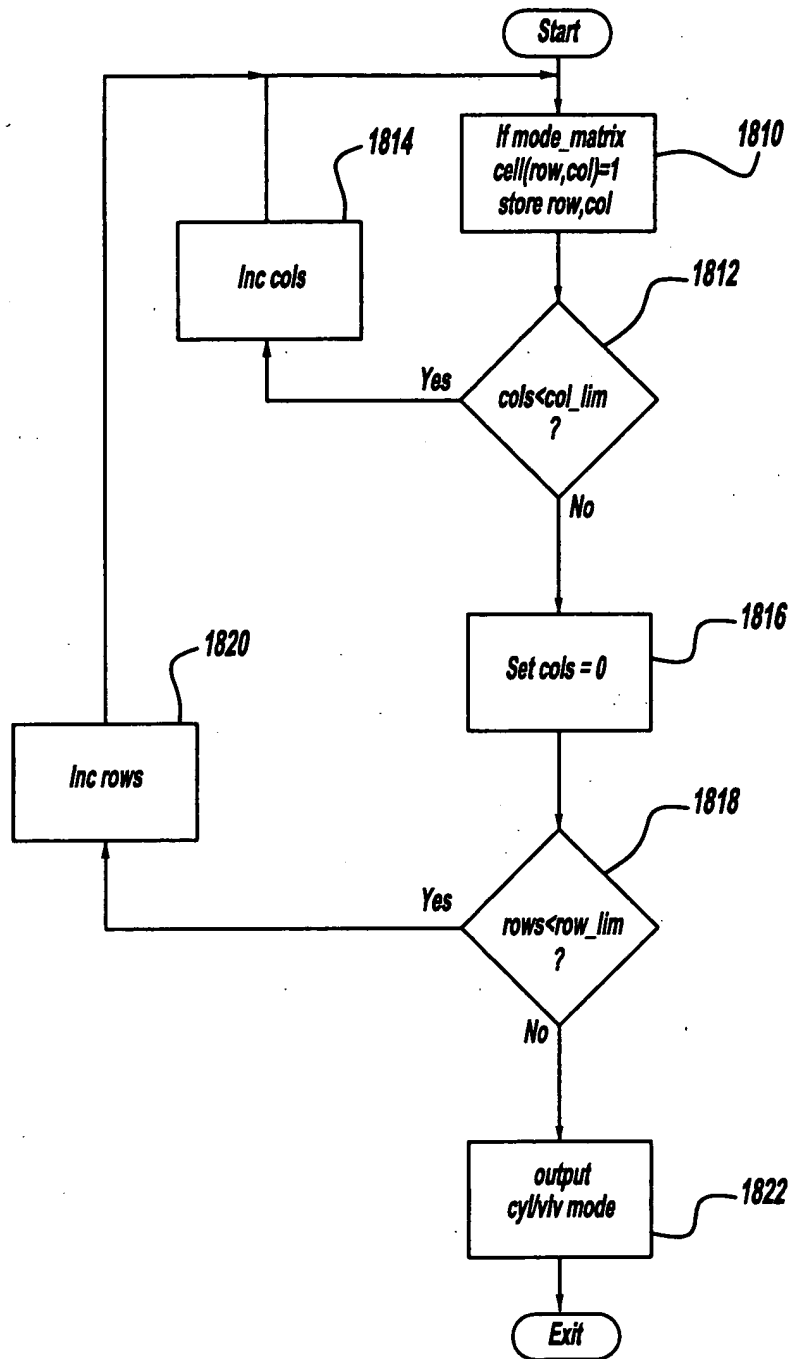
FIG - 14

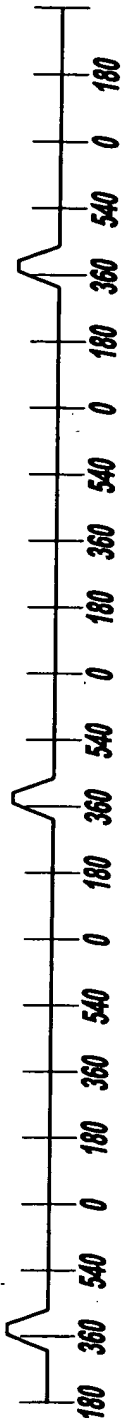
FIG - 15

**FIG - 16**

**FIG - 17**

**FIG - 18**

Cylinder #1
Intake valve A



Cylinder #1
Intake valve B

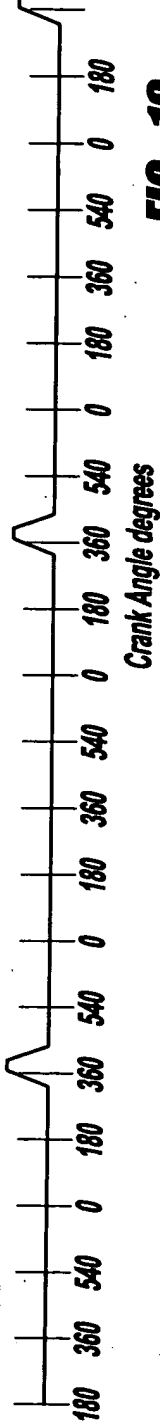
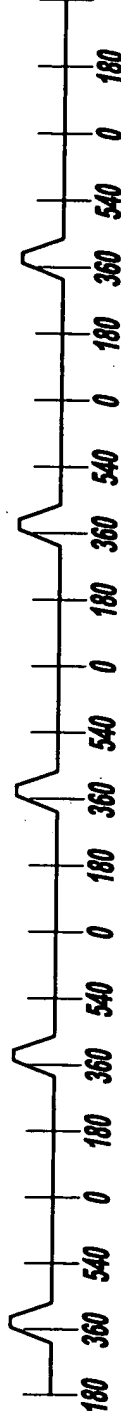


FIG - 19

Cylinder #1
Intake valve A



Cylinder #1
Intake valve B

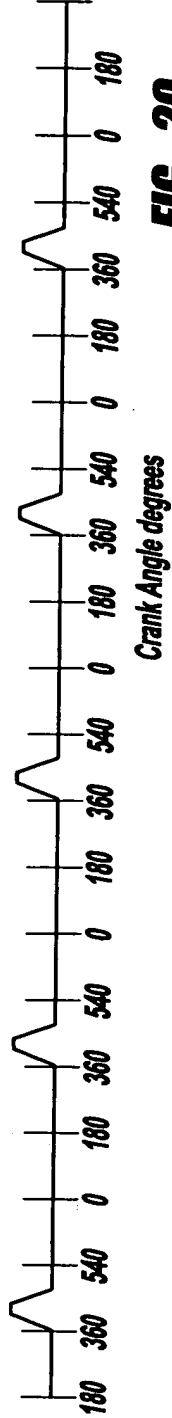


FIG - 20

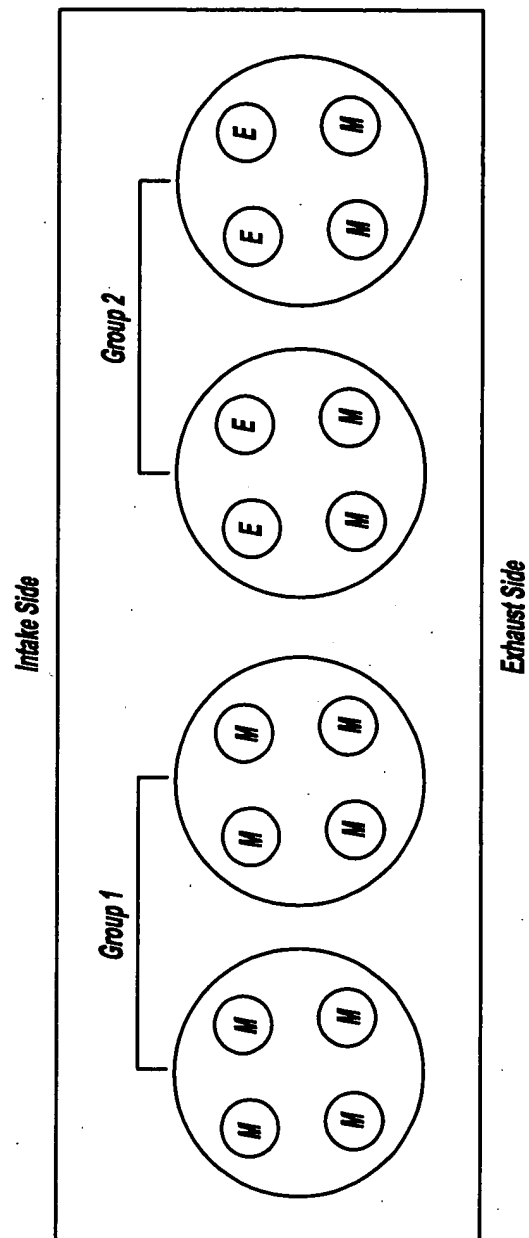


FIG - 21

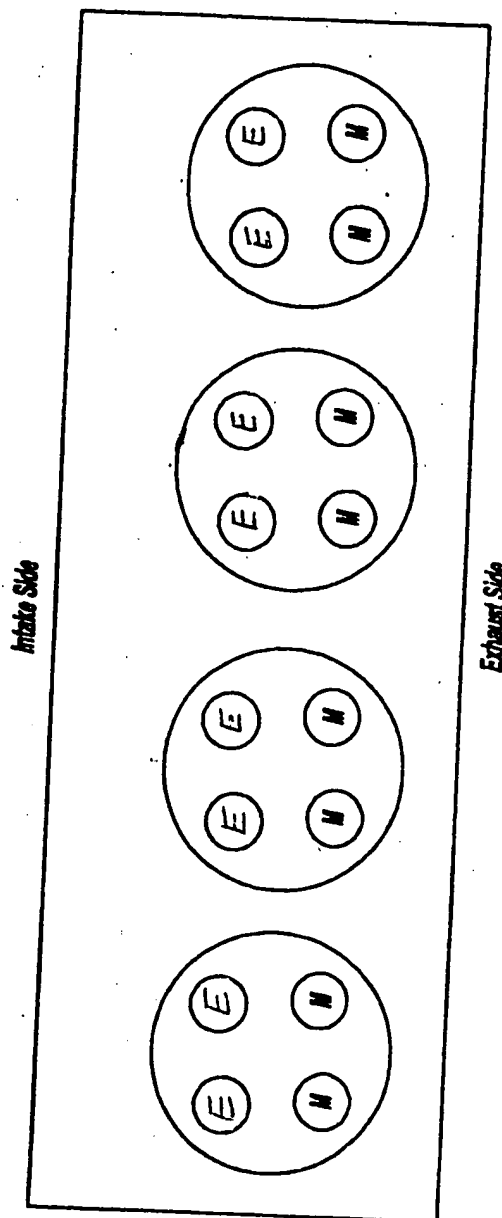


FIG - 21A

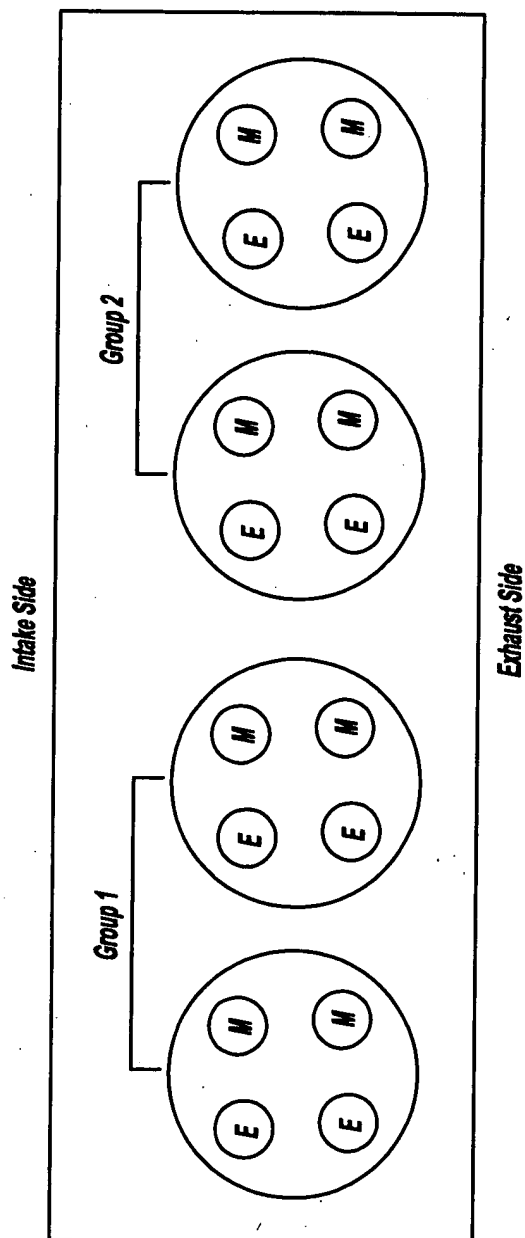


FIG - 22

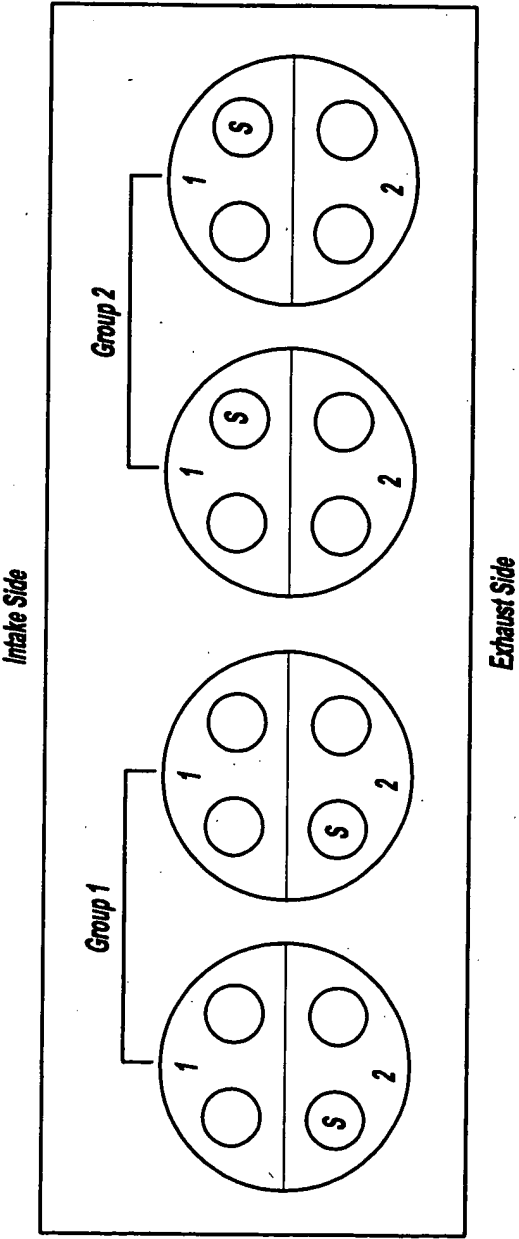


FIG - 23

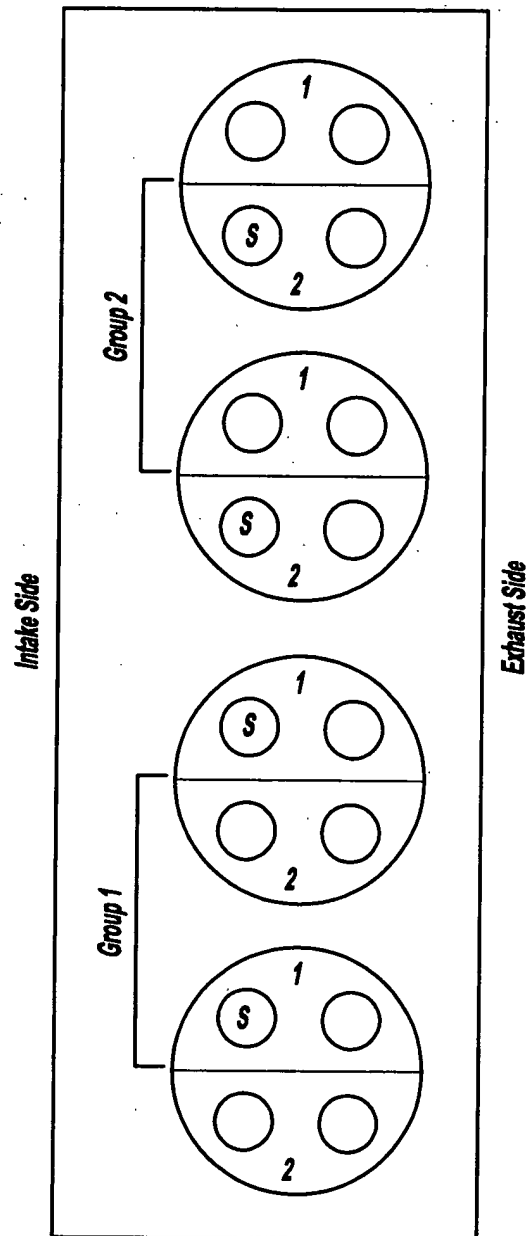


FIG - 24

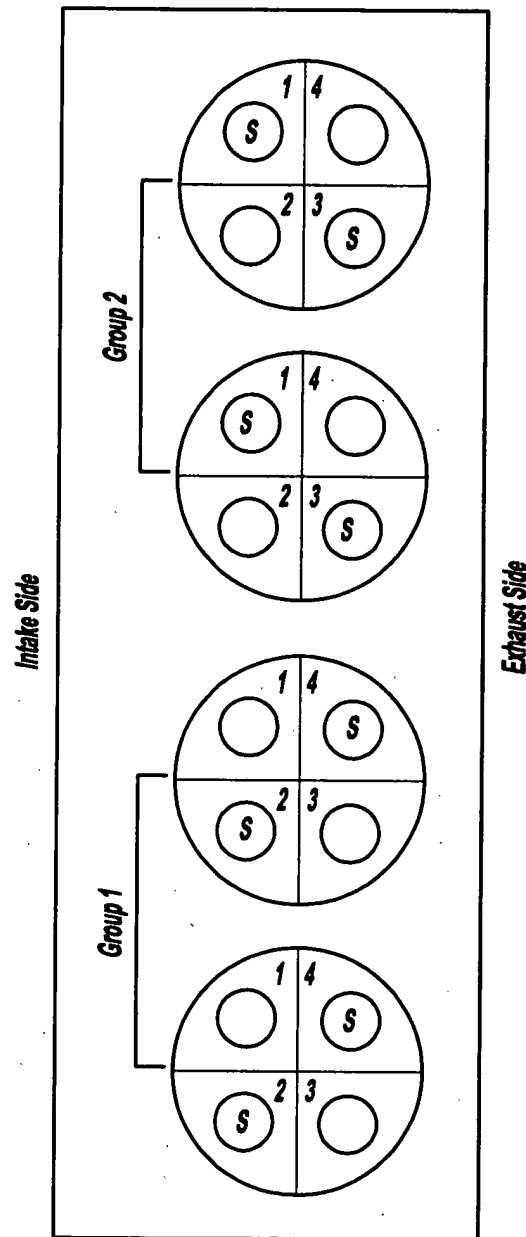


FIG - 25

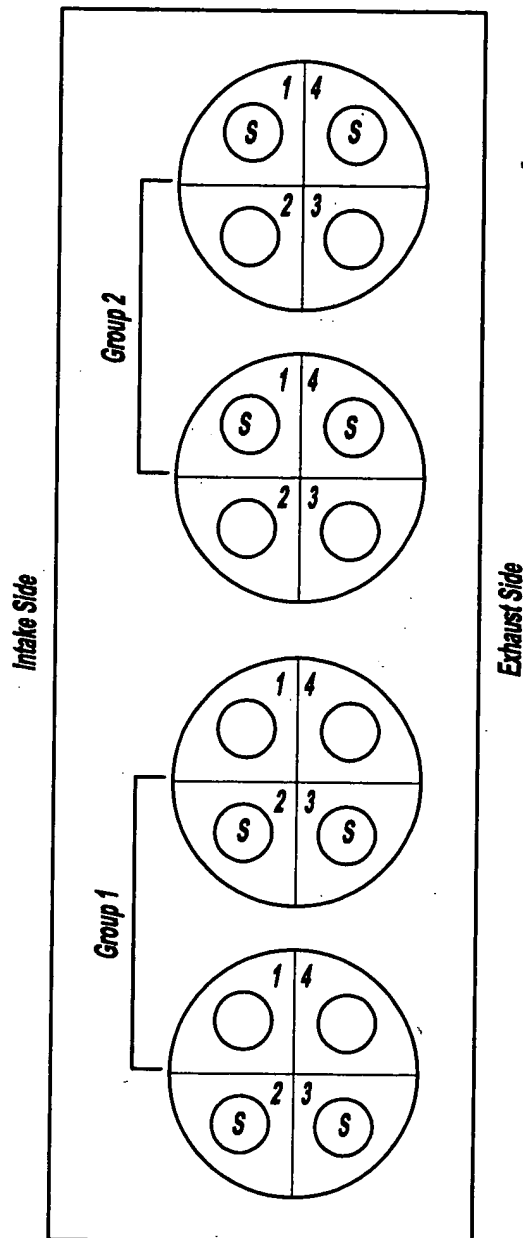


FIG - 26

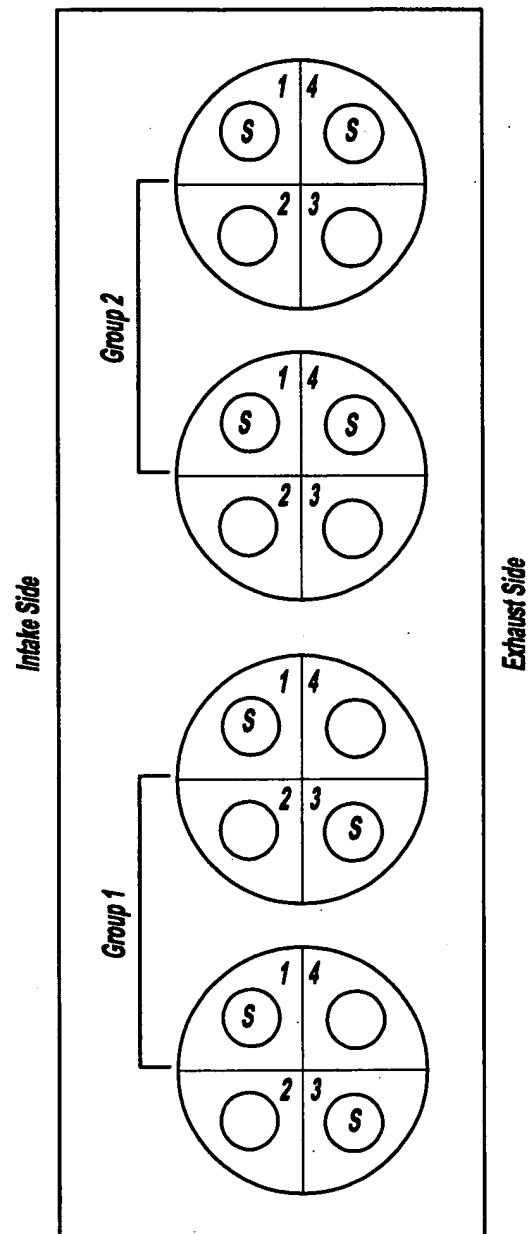
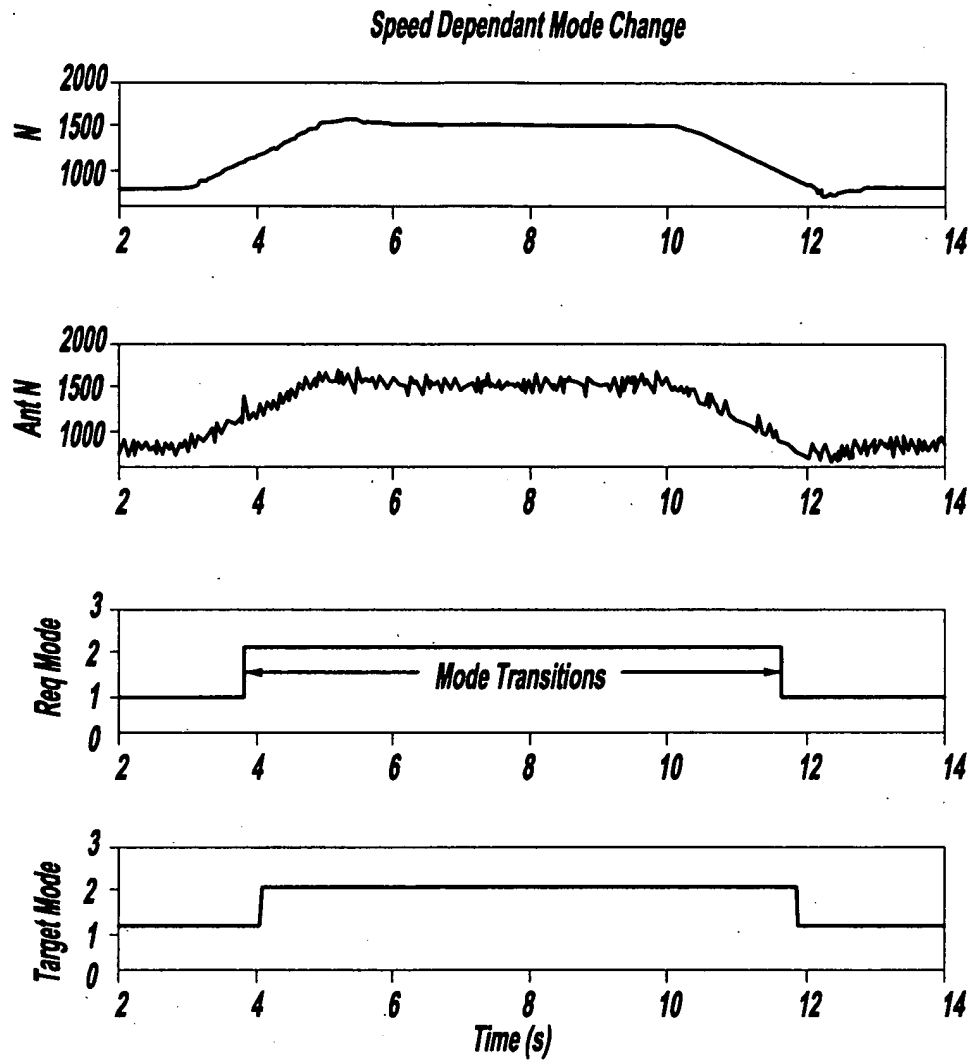
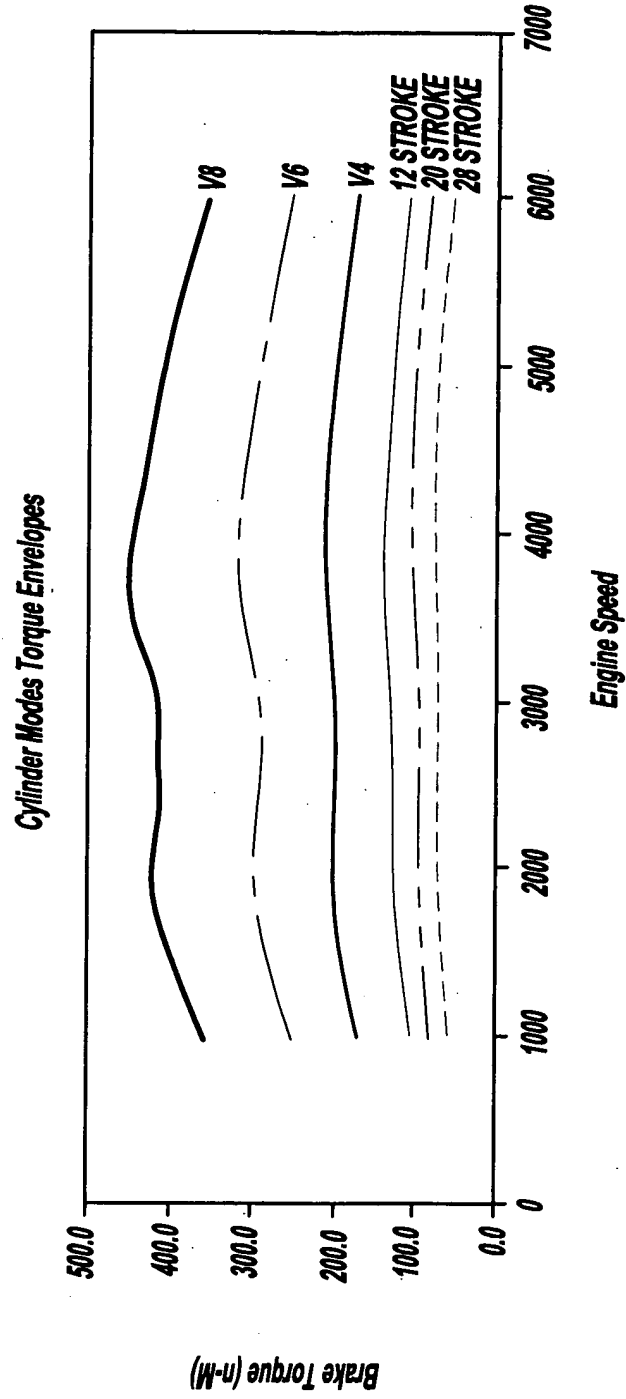


FIG - 27

**FIG - 28**

**FIG - 29**

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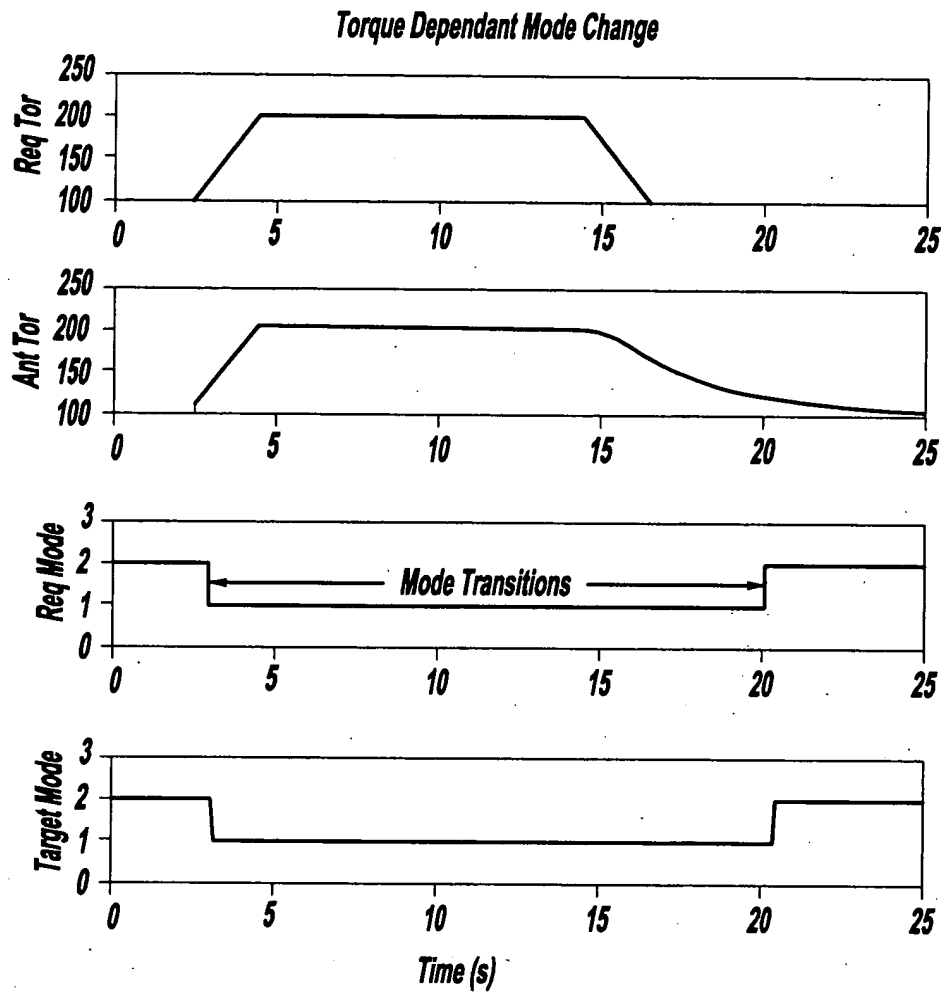
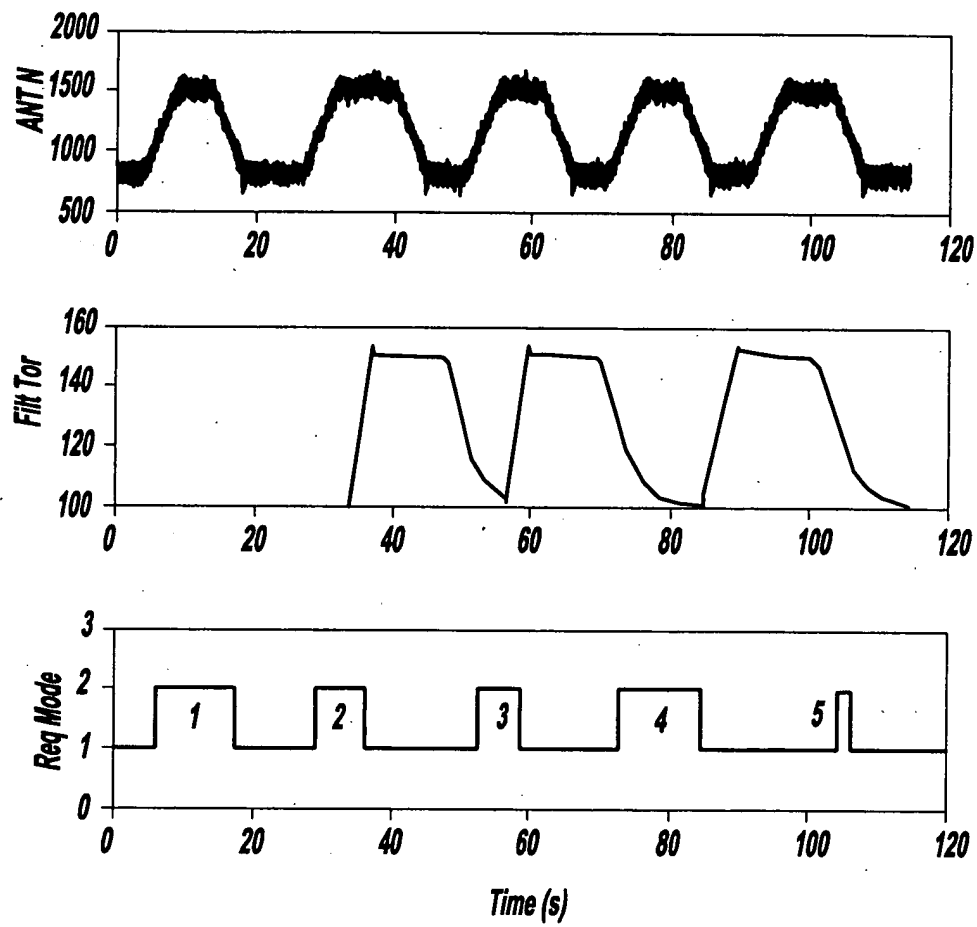
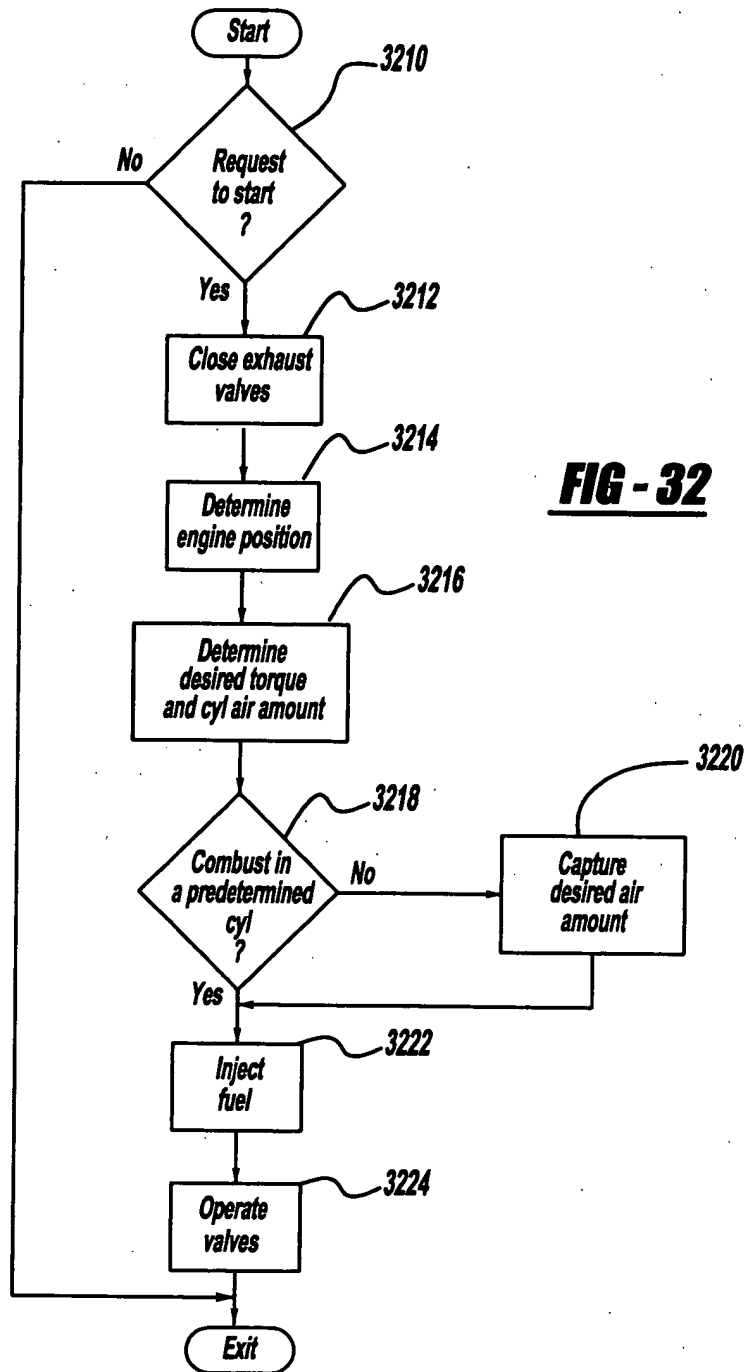


FIG - 30

Speed and Torque Dependant Mode Changes**FIG - 31**



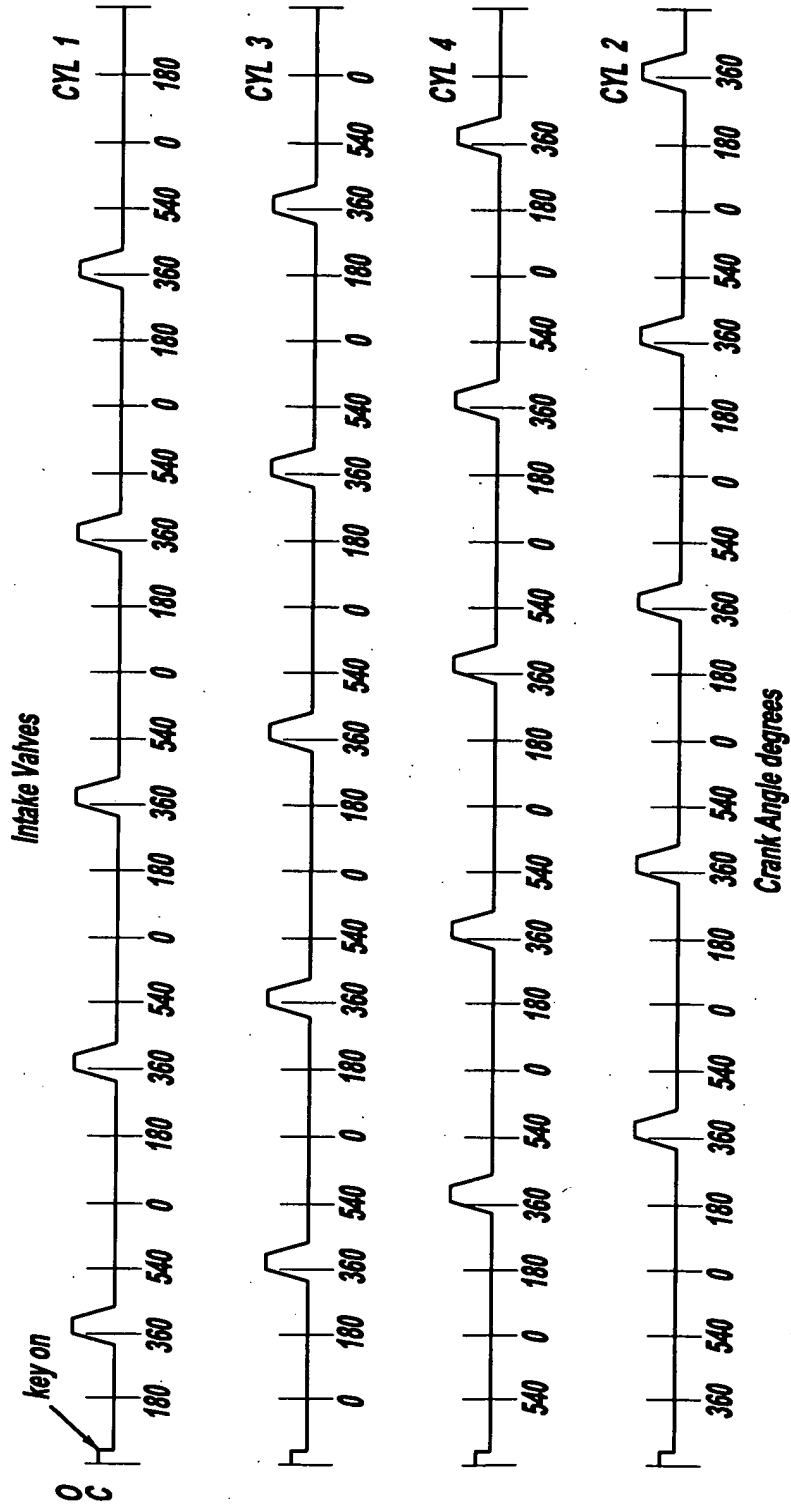


FIG - 33a

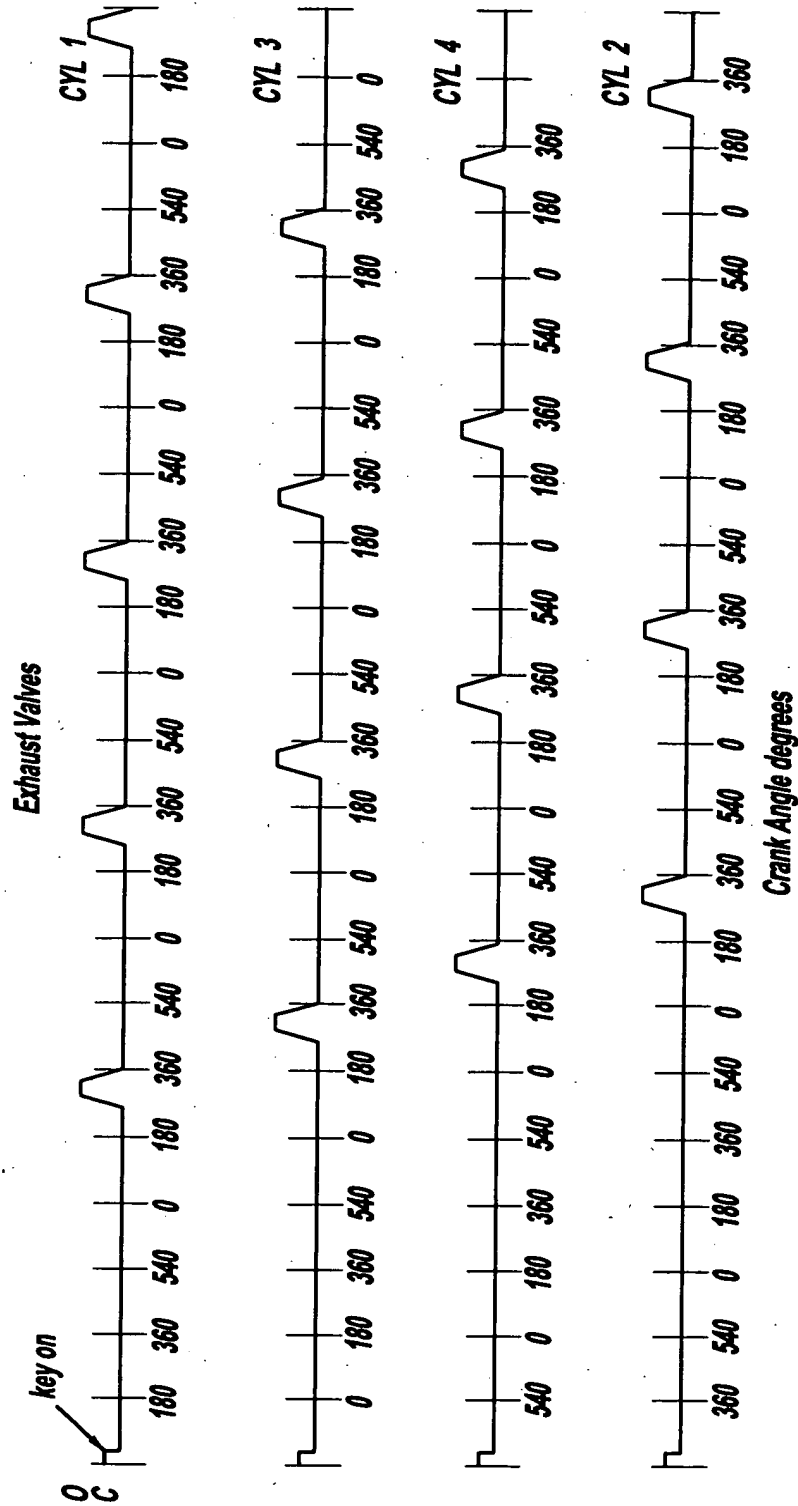


FIG - 33b

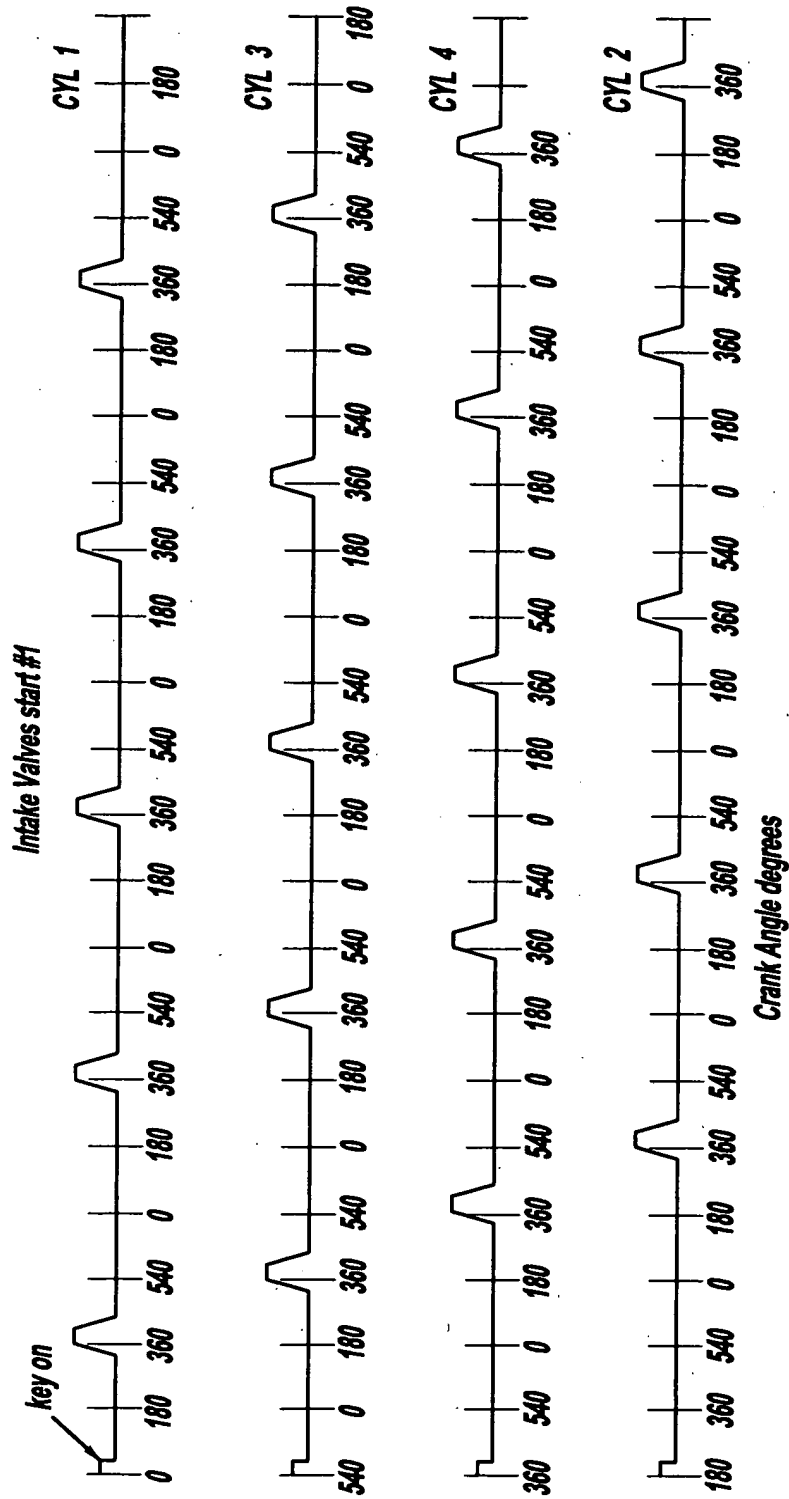


FIG - 34a

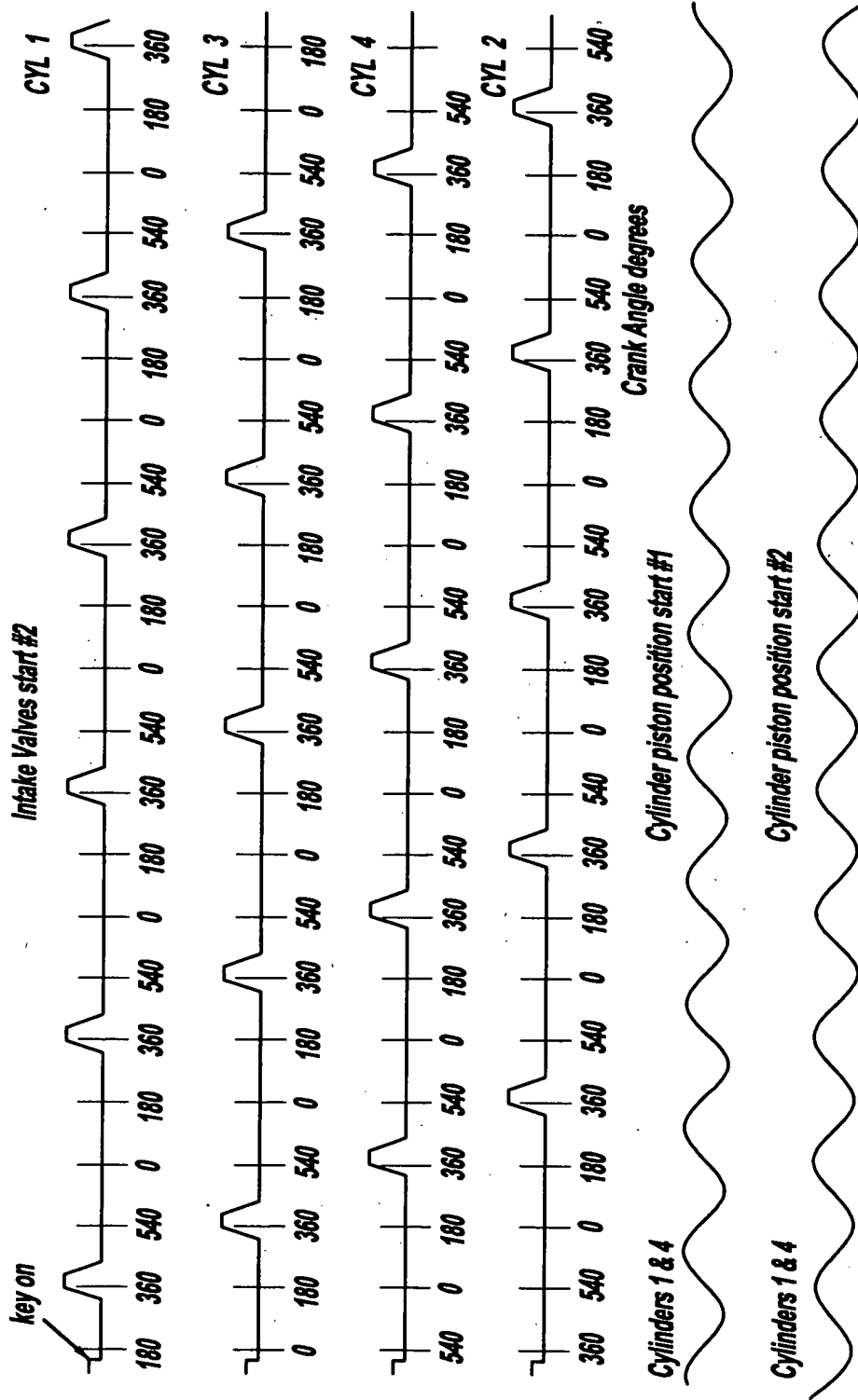
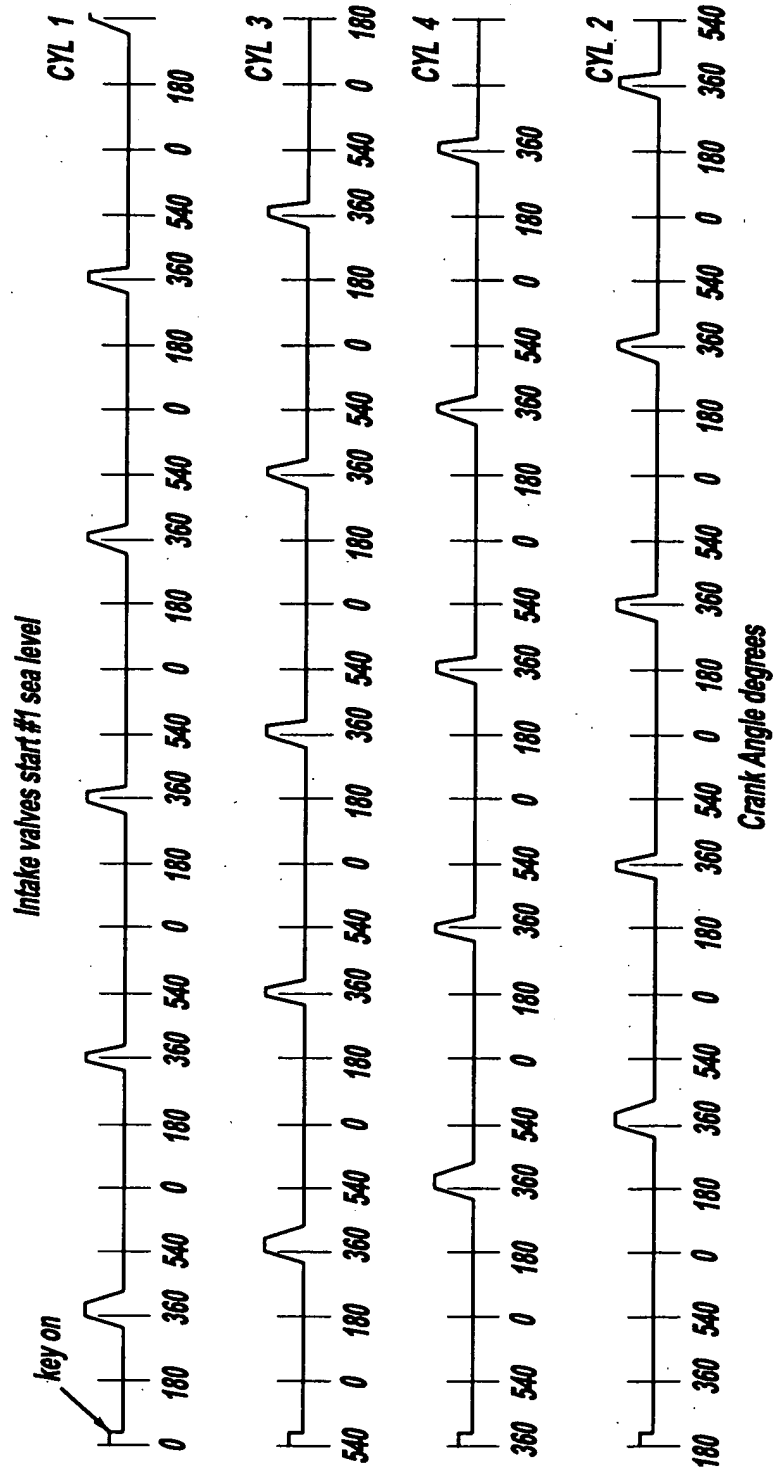
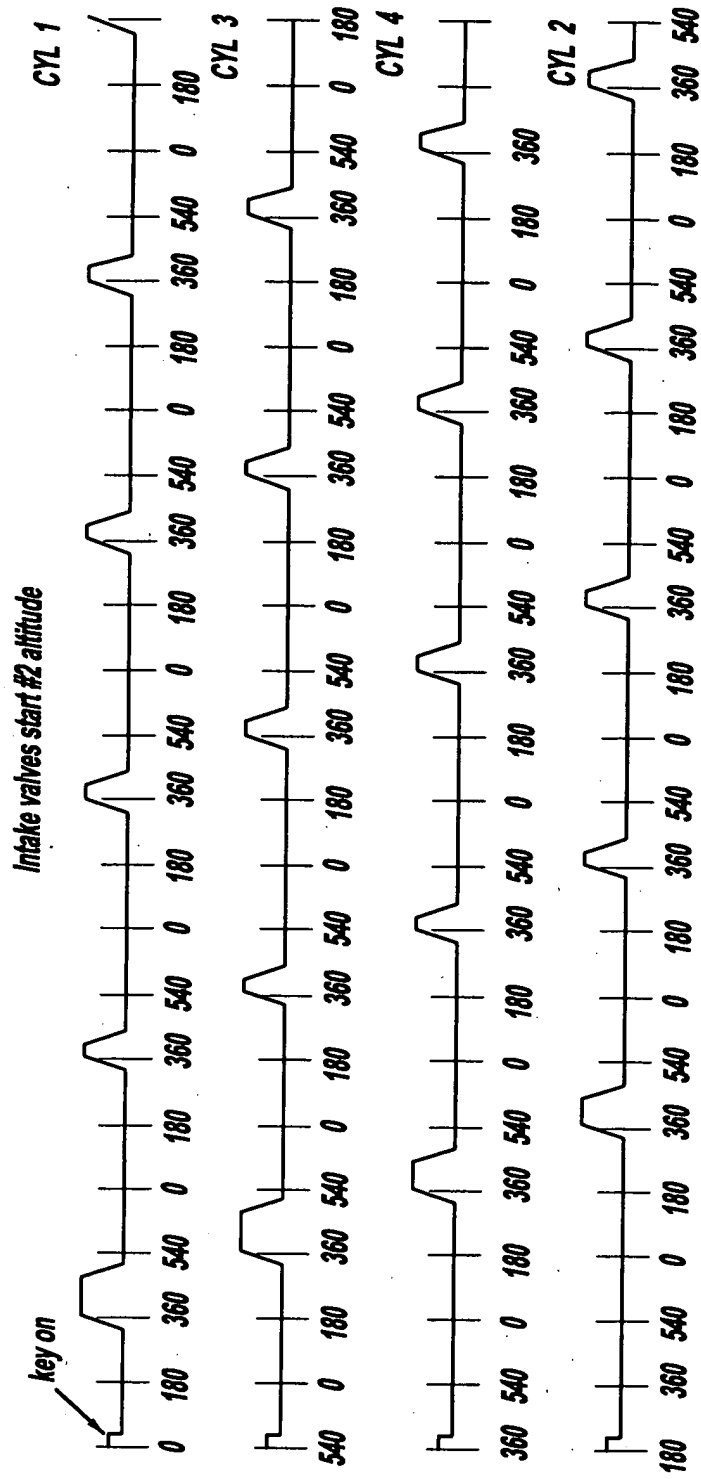
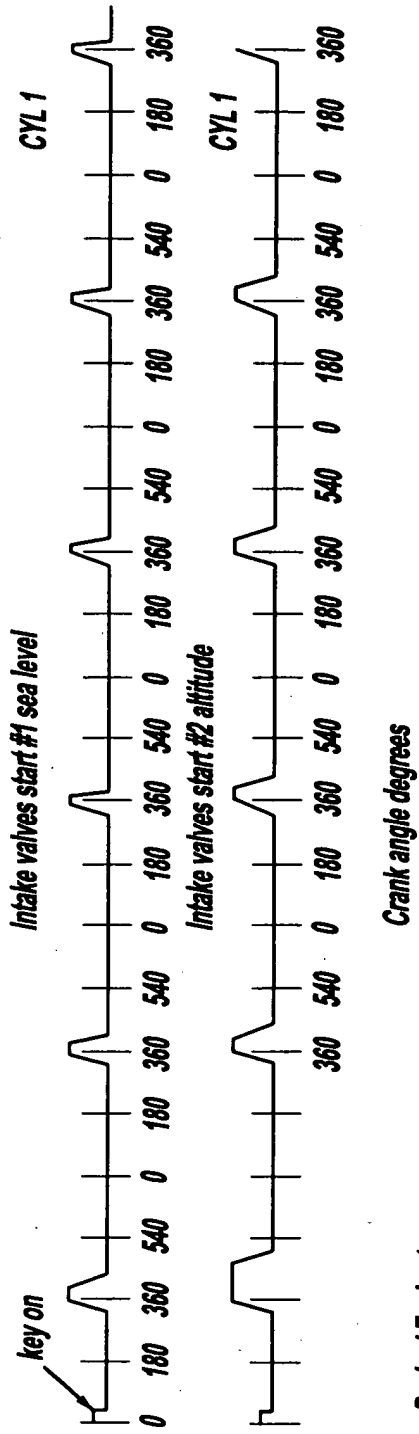


FIG - 34b

**FIG - 35a**

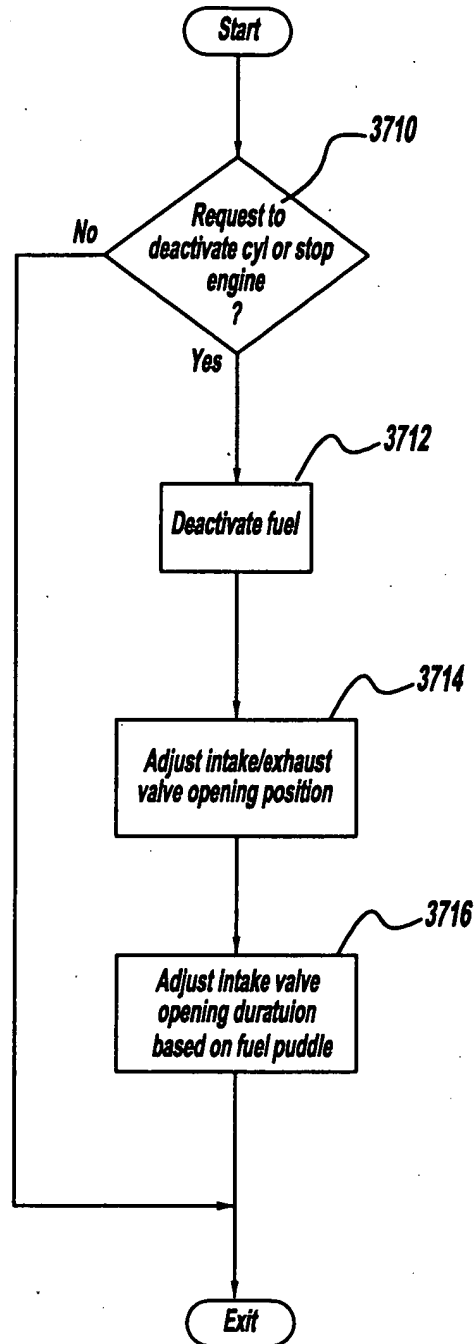
**FIG - 35b**

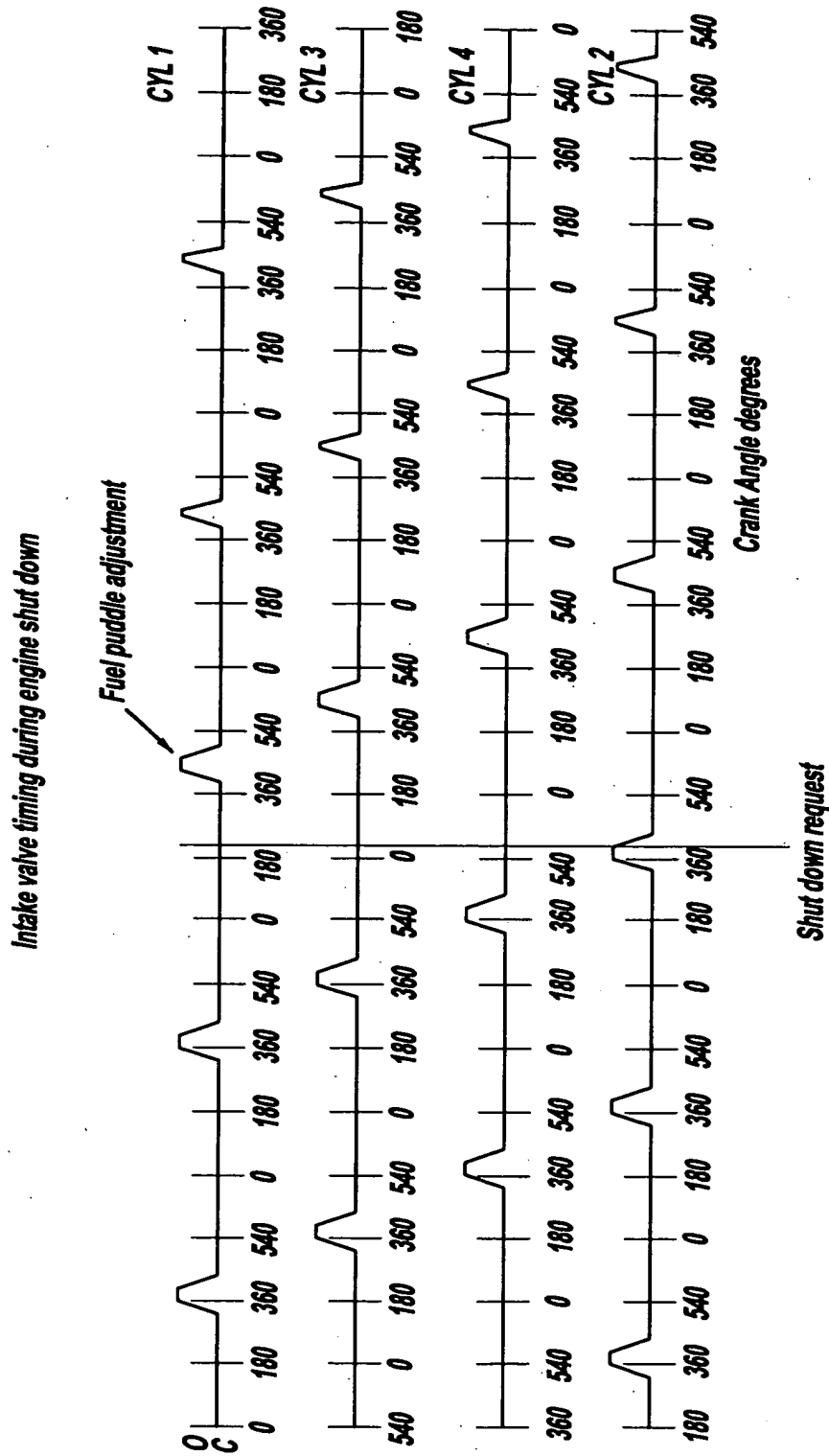


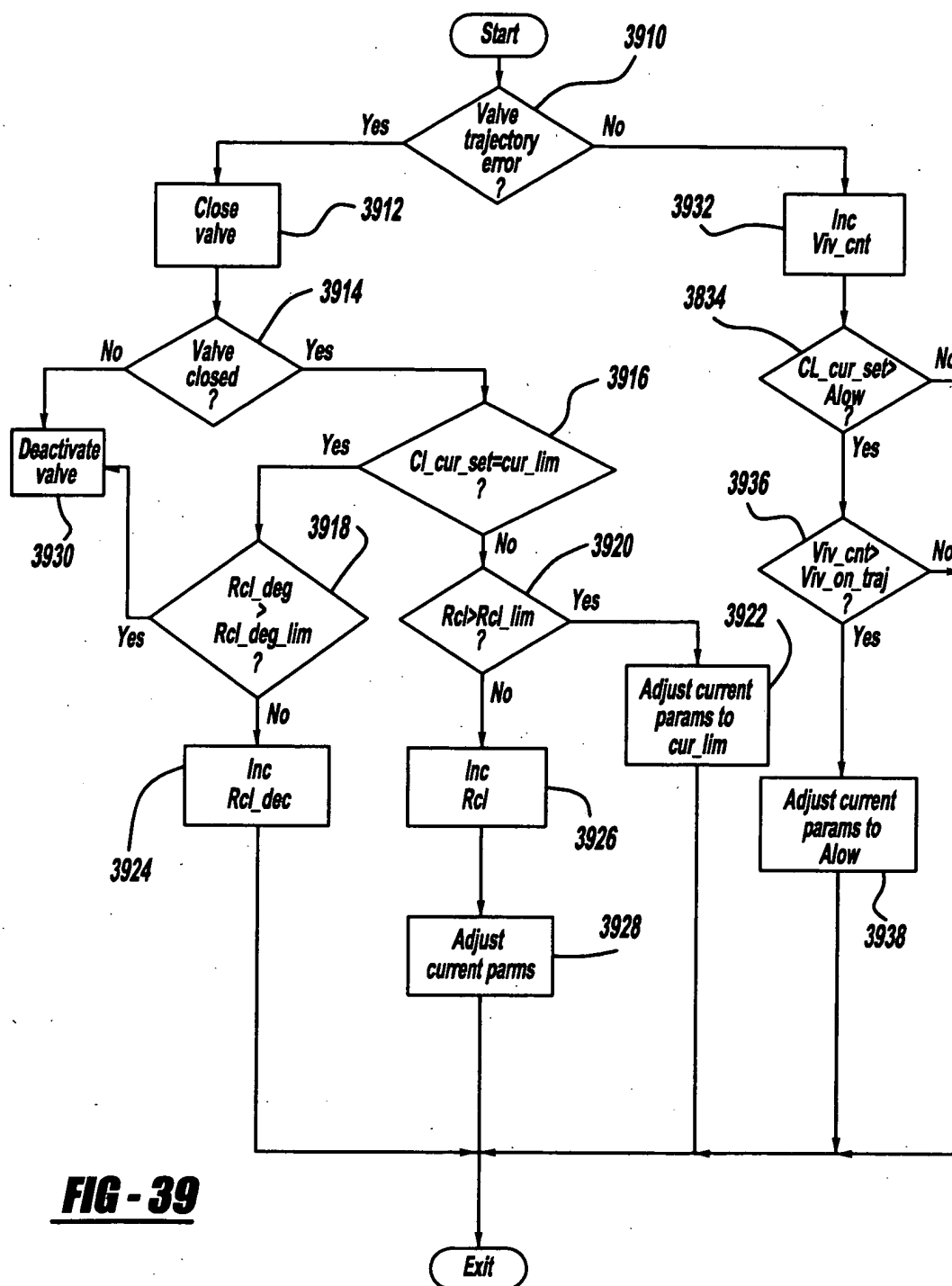
Desired Engine torque

Engine Speed

FIG - 36

**FIG - 37**

**FIG - 38**



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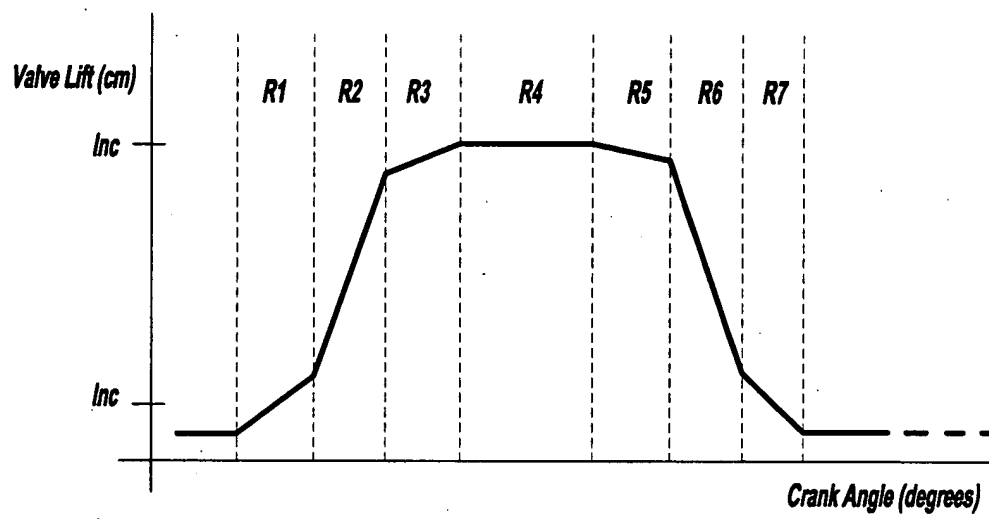


FIG - 40

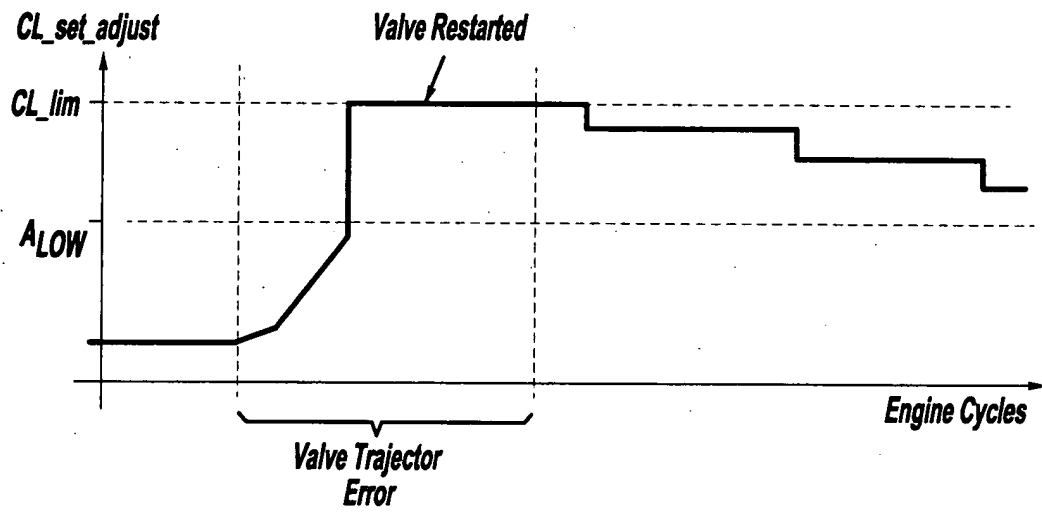
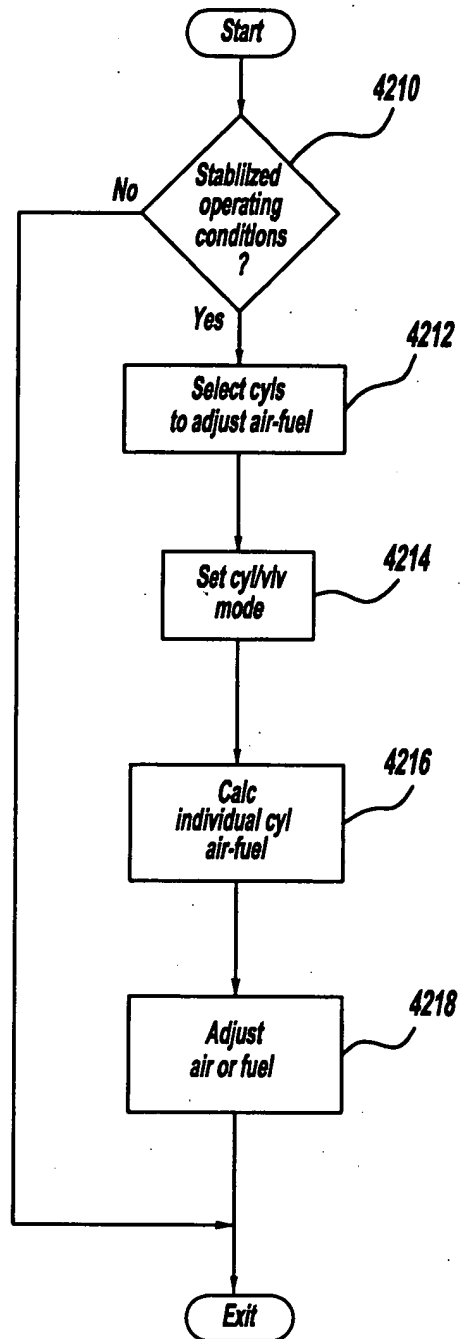


FIG - 41

**FIG - 42**

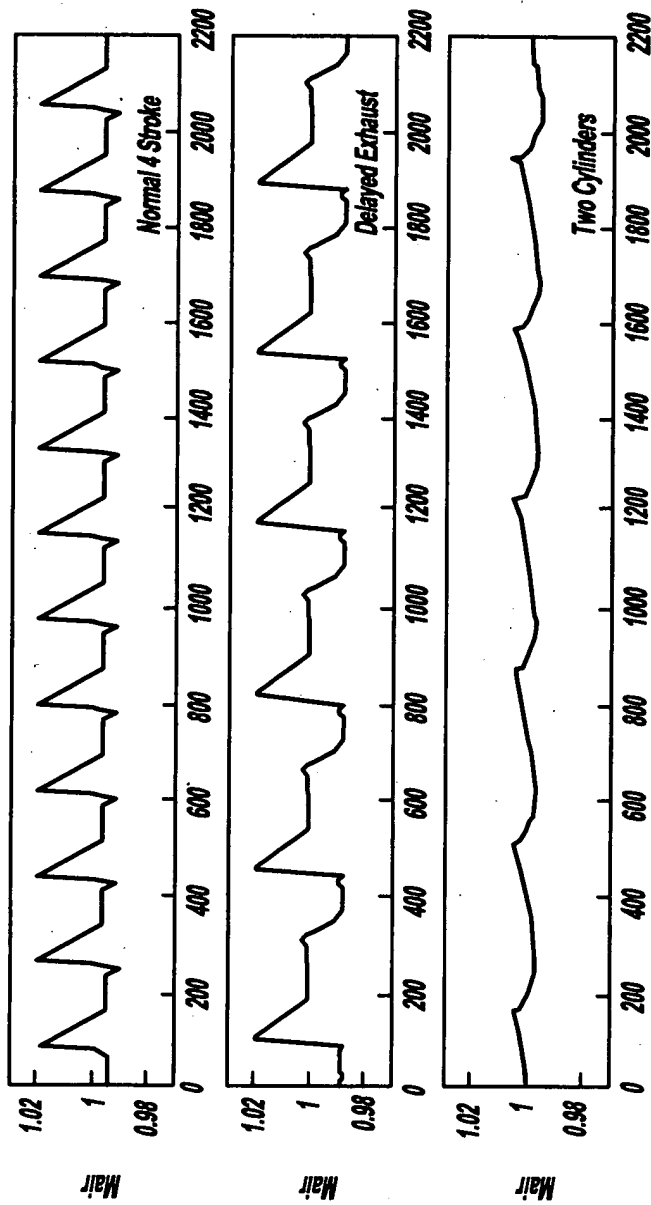
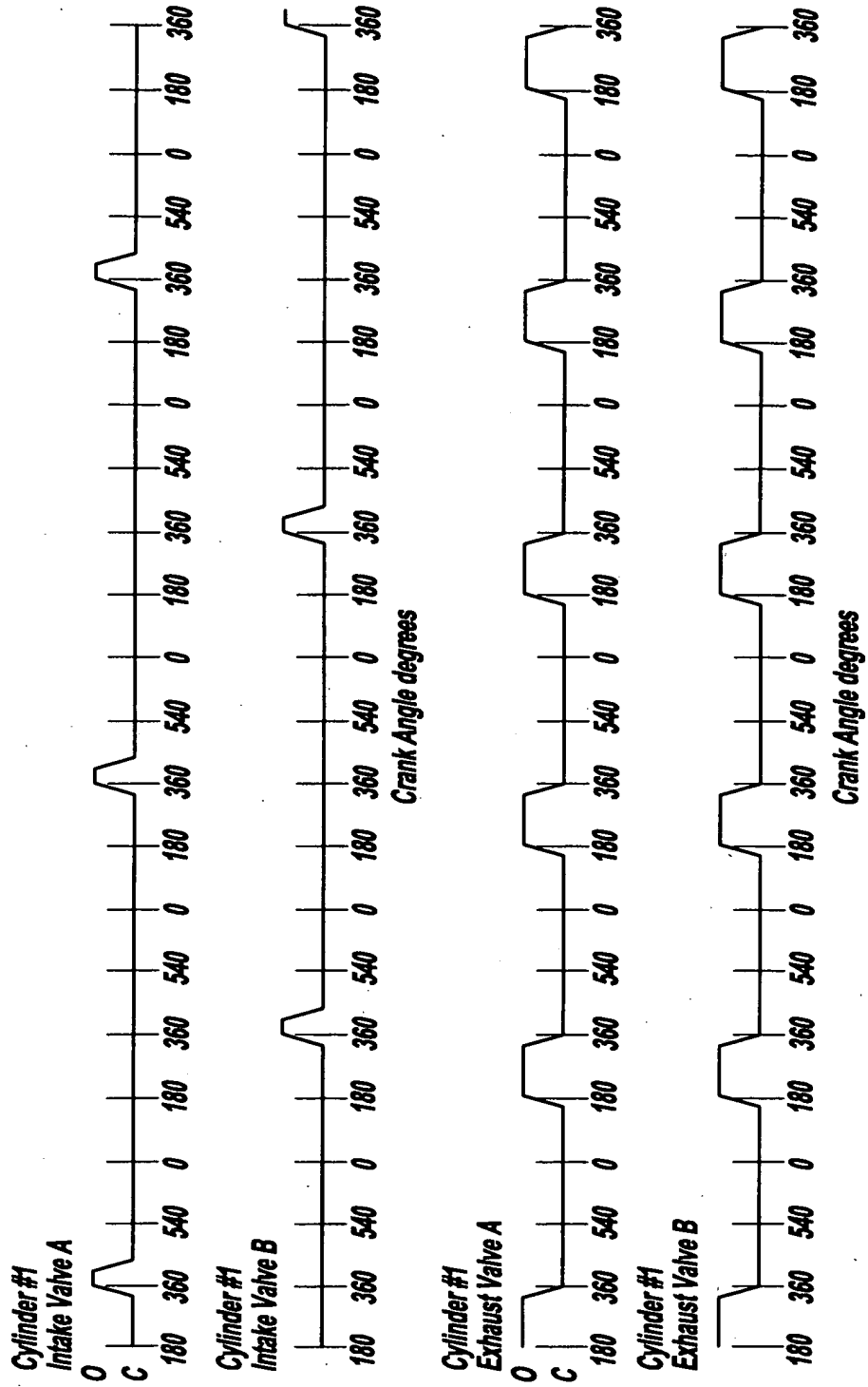


FIG - 43

**FIG - 44**

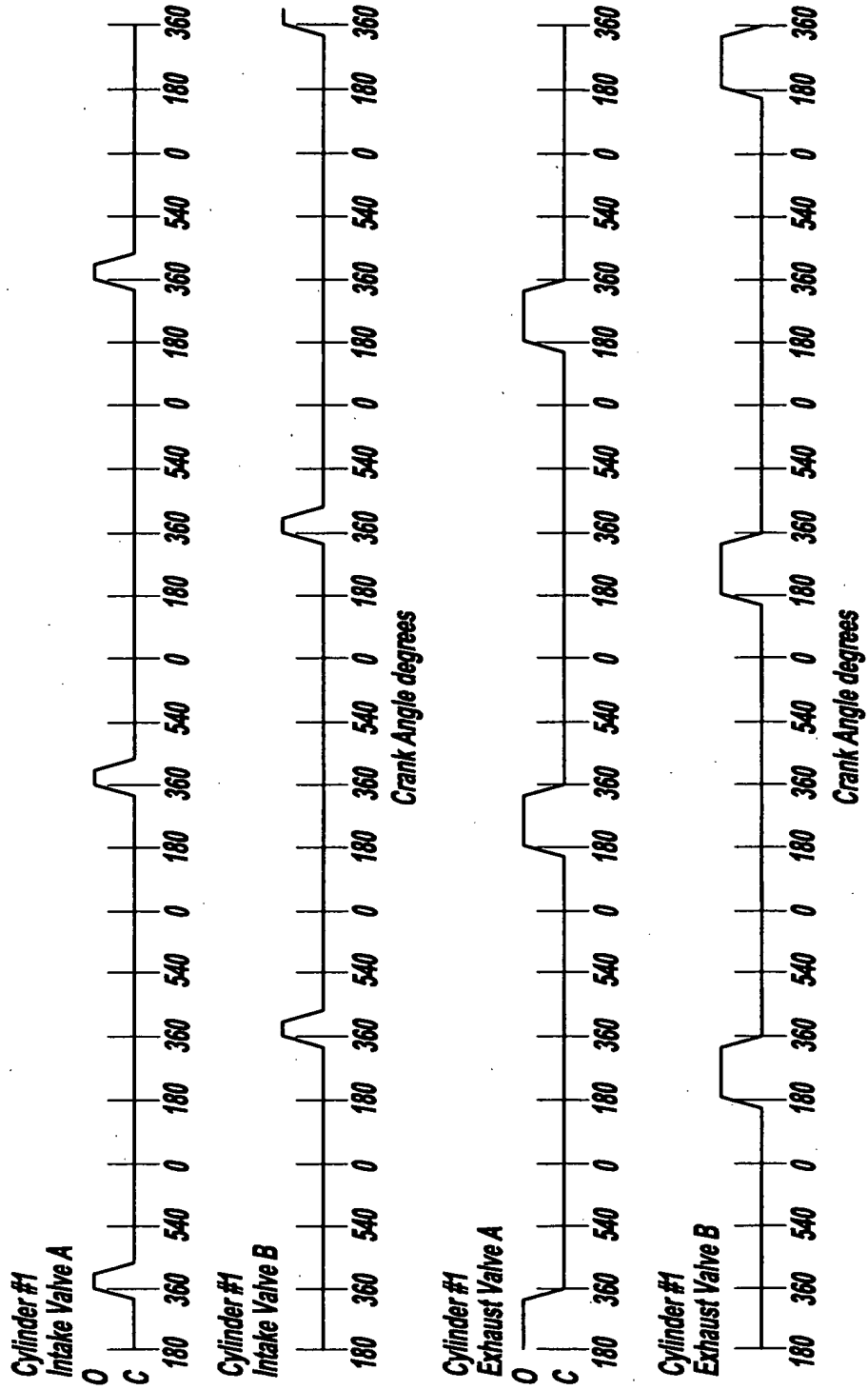


FIG - 45

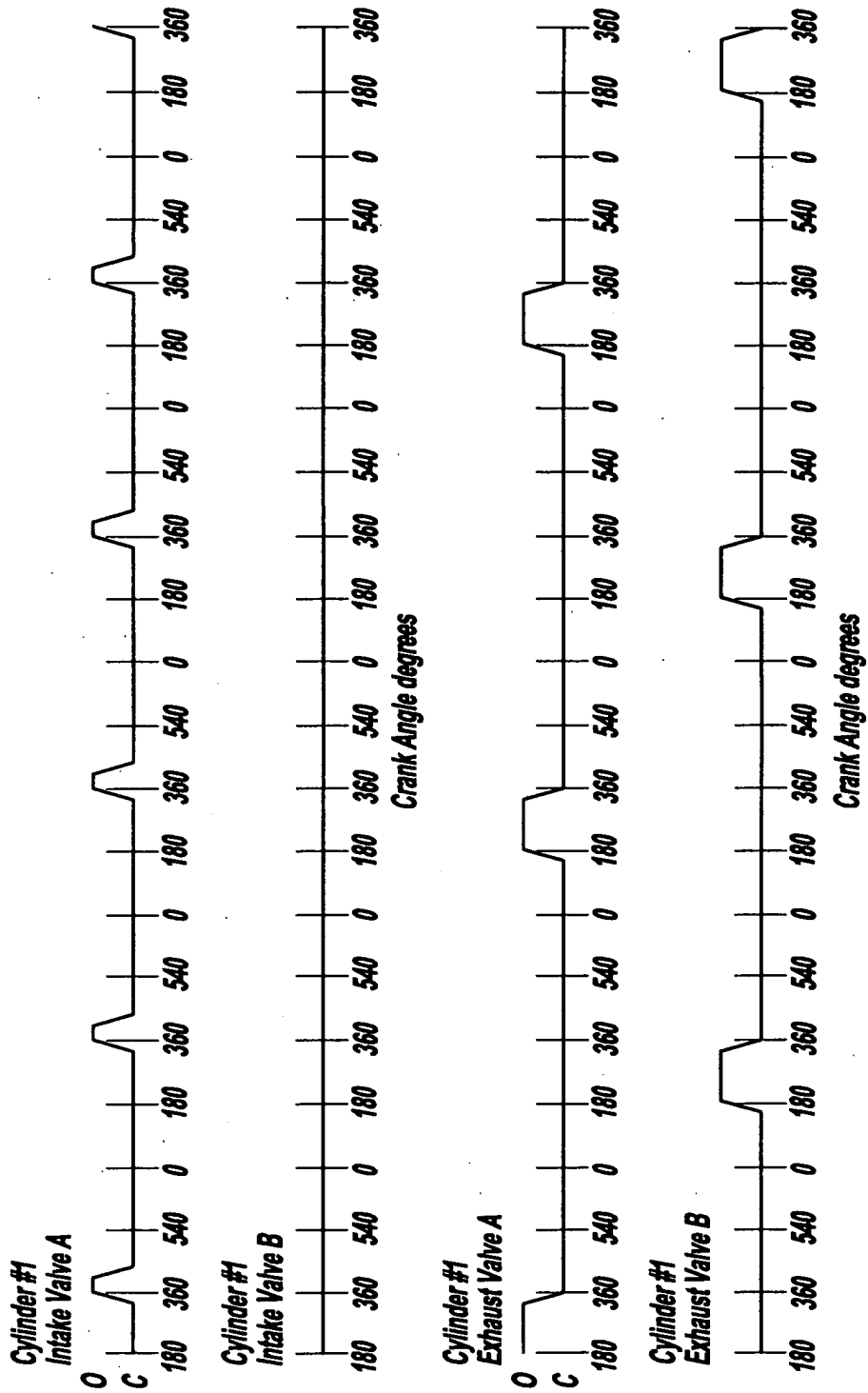


FIG - 46

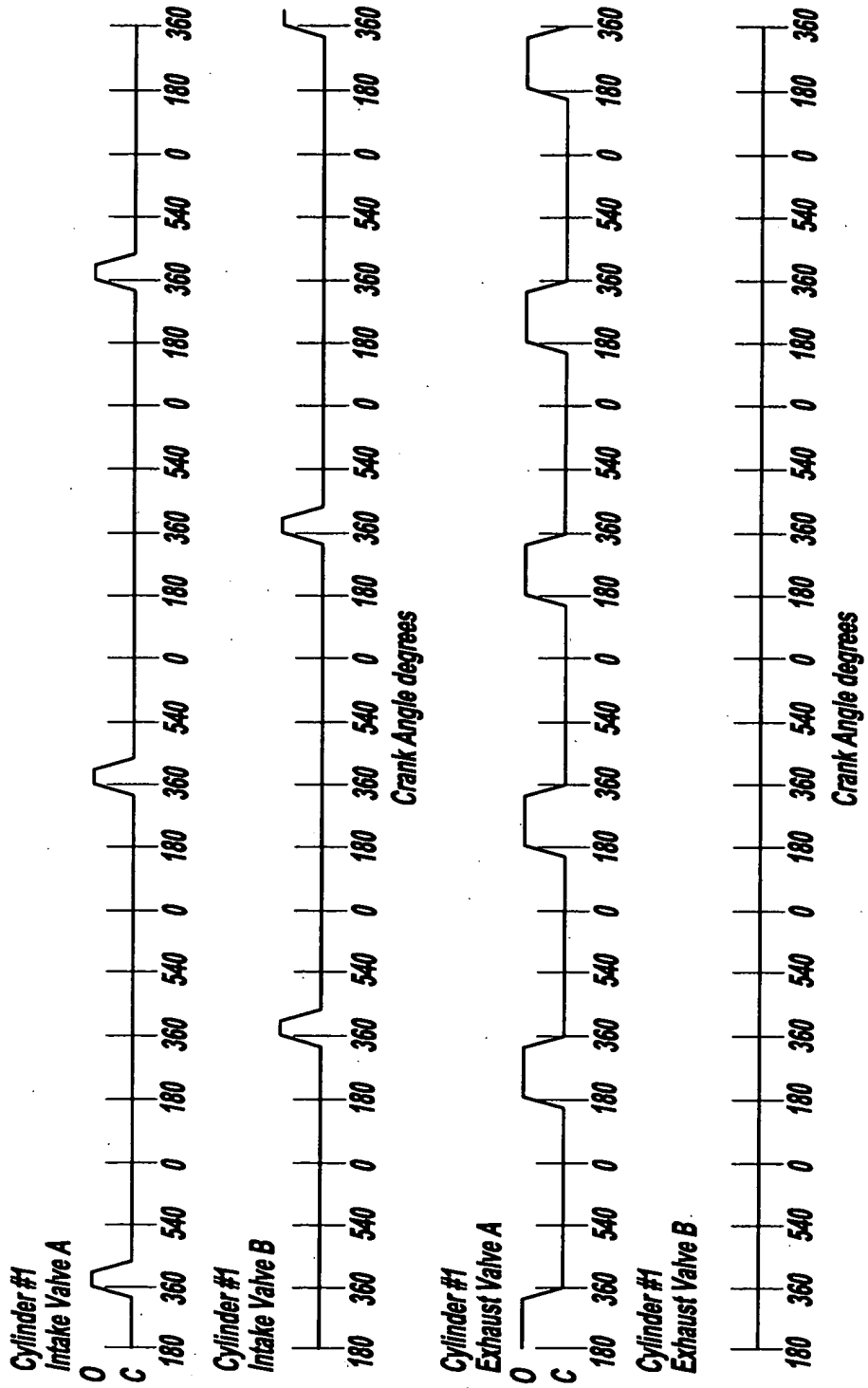


FIG - 47

FIG - 48

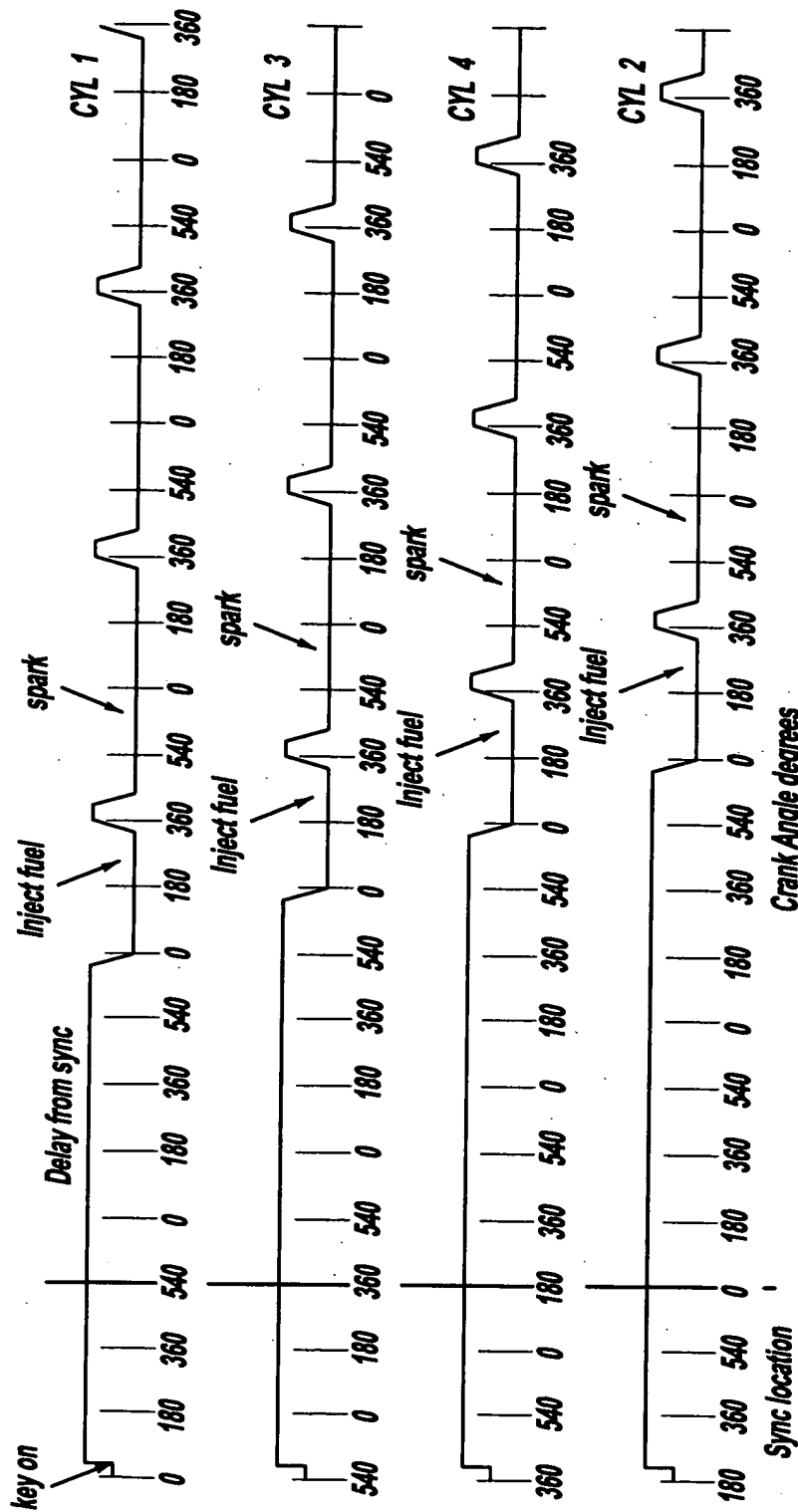
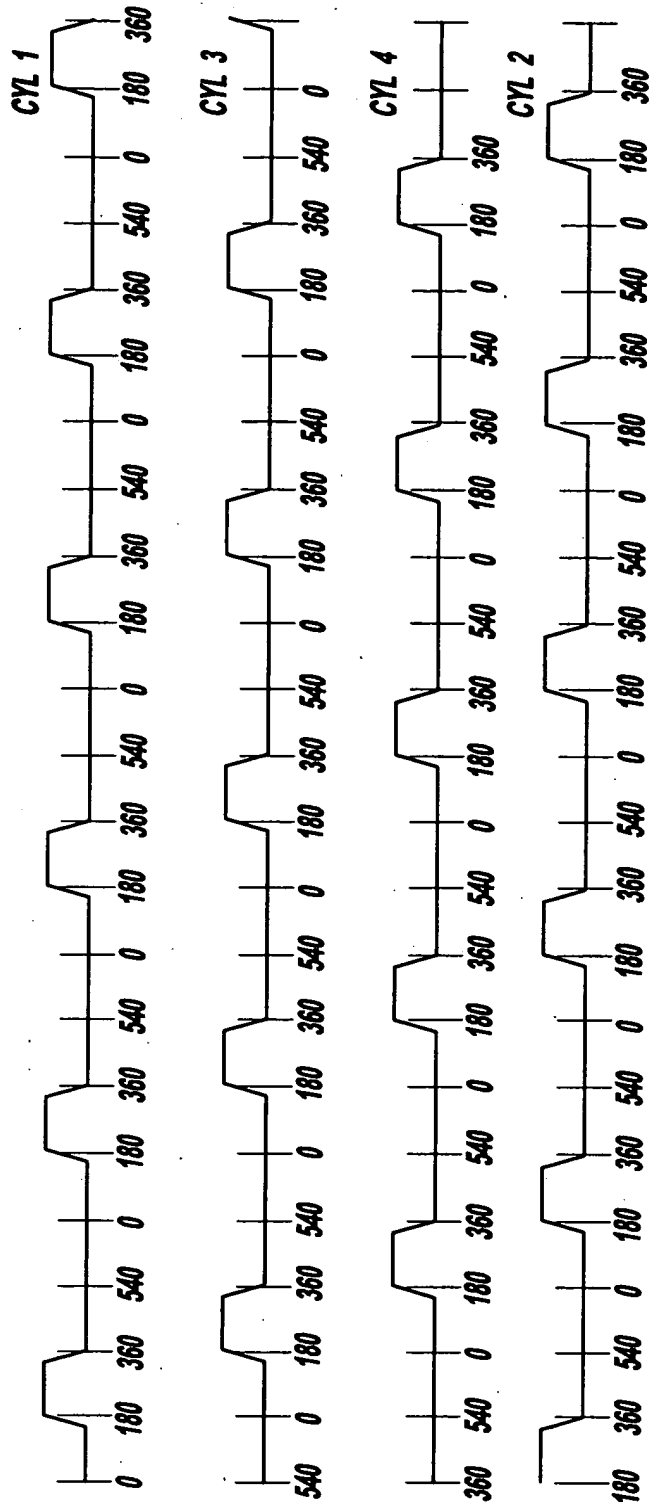


FIG - 49a

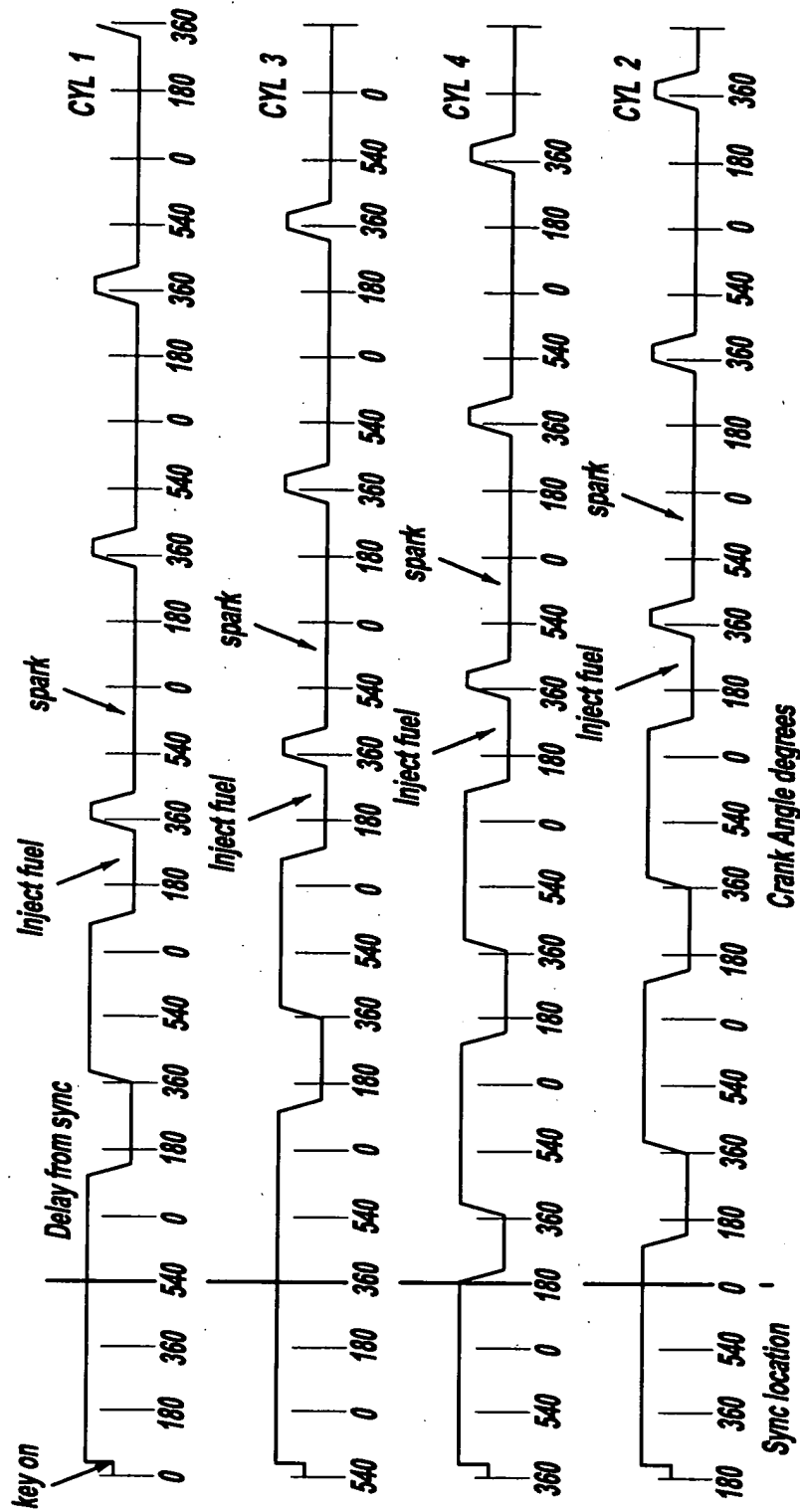


Crank Angle degrees
Exhaust Valve Timing From Start (mechanical valve operation)

Cylinder piston position cyl 1 & 4

Cylinders 2 & 3

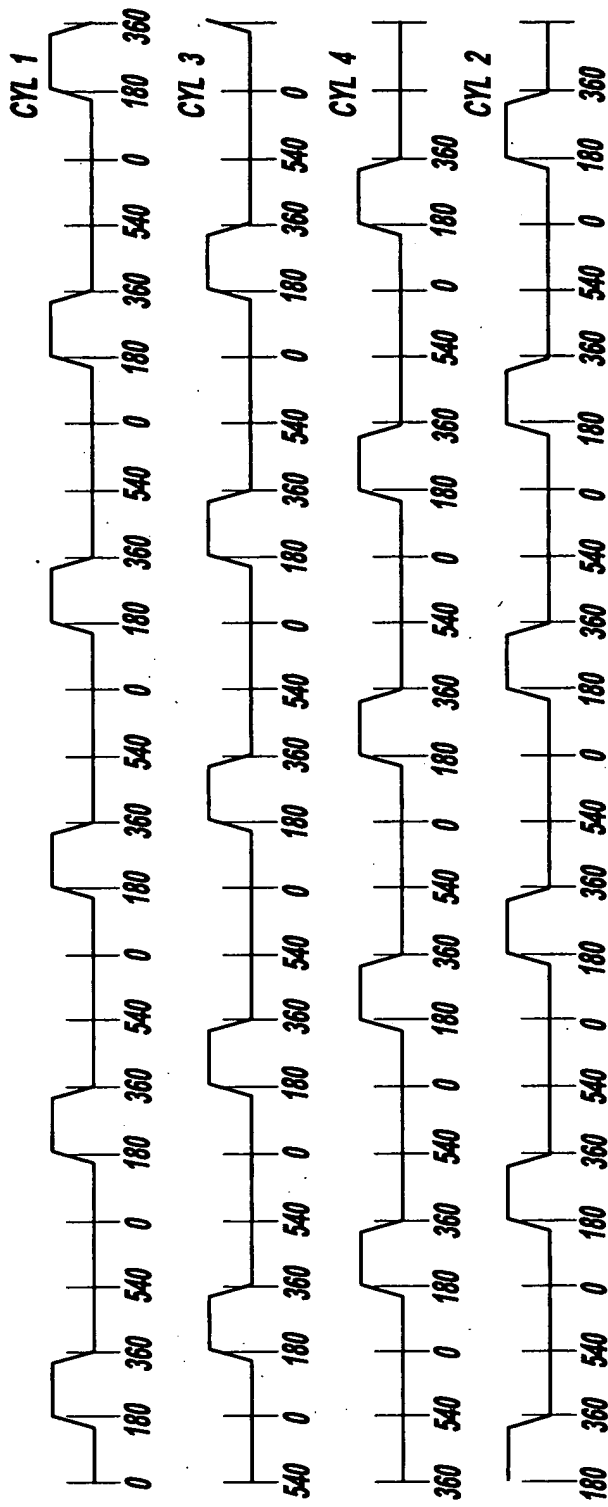
FIG - 49b



Crank Angle degrees

Intake Valve Timing From Start (electrical valve operation)

FIG - 50a



Crank Angle degrees
Exhaust Valve Timing From Start (mechanical valve operation)

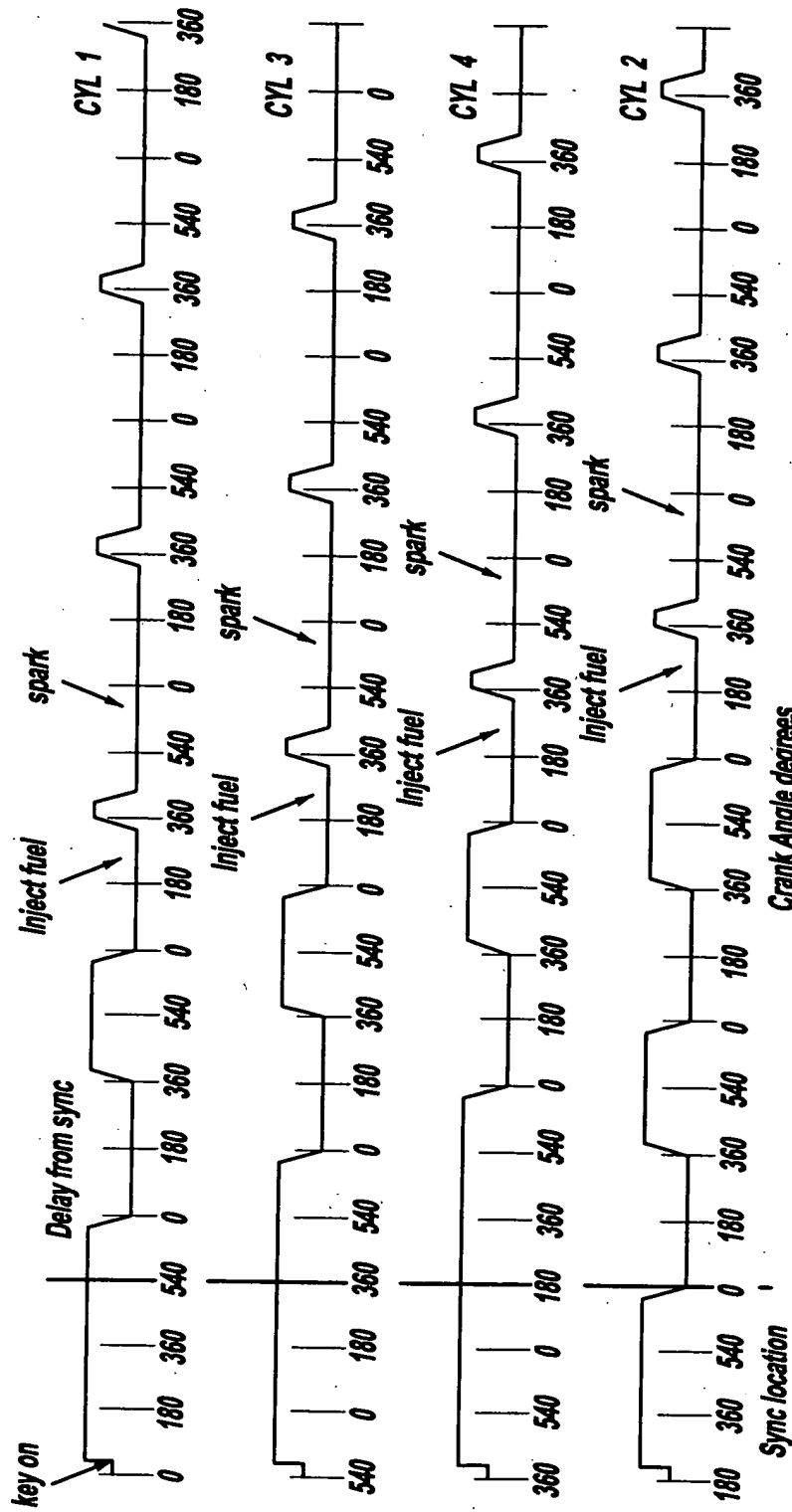
Cylinder piston position cyl 1 & 4

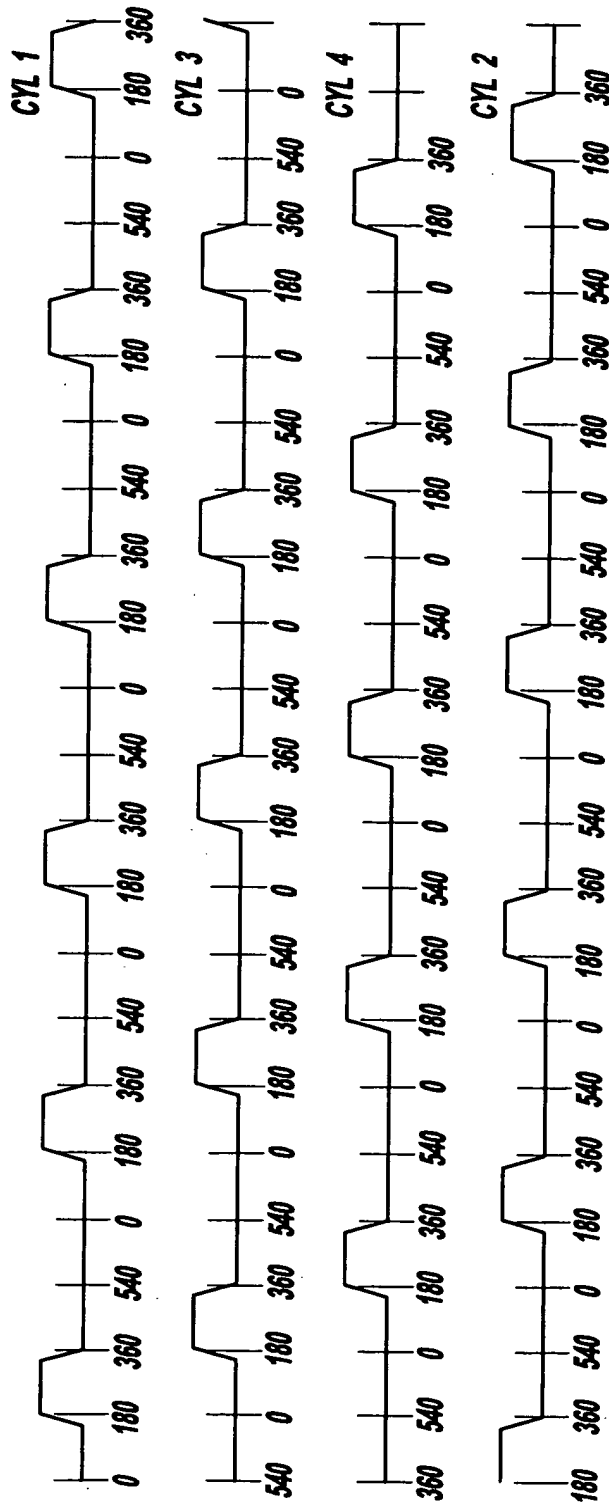


Cylinders 2 & 3



FIG - 50b





Crank Angle degrees

Exhaust Valve Timing From Start (mechanical valve operation)

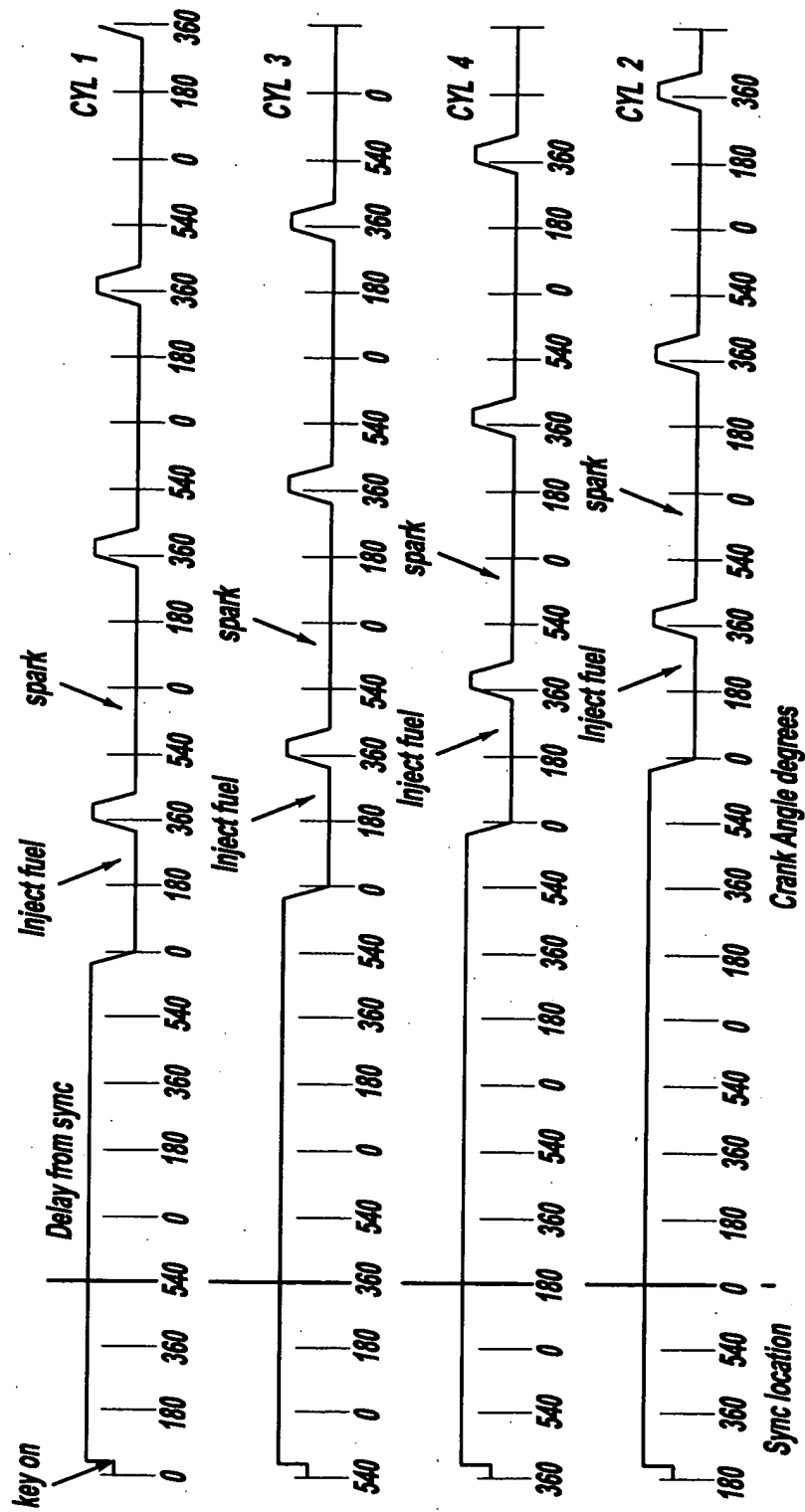
Cylinder piston position cyl 1 & 4



Cylinders 2 & 3

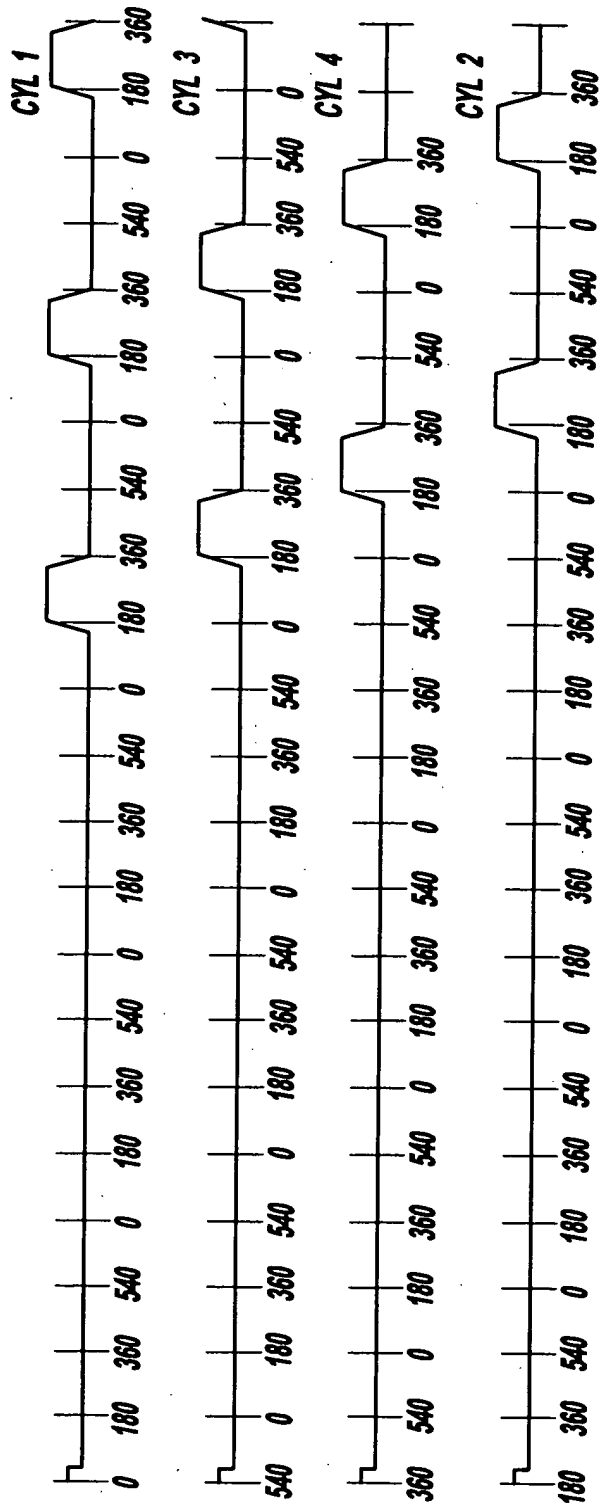


FIG - 51b



Intake Valve Timing From Start (electrical valve operation)

FIG - 52a



Cylinder piston position cyl 1 & 4

Cylinders 2 & 3

FIG - 52b

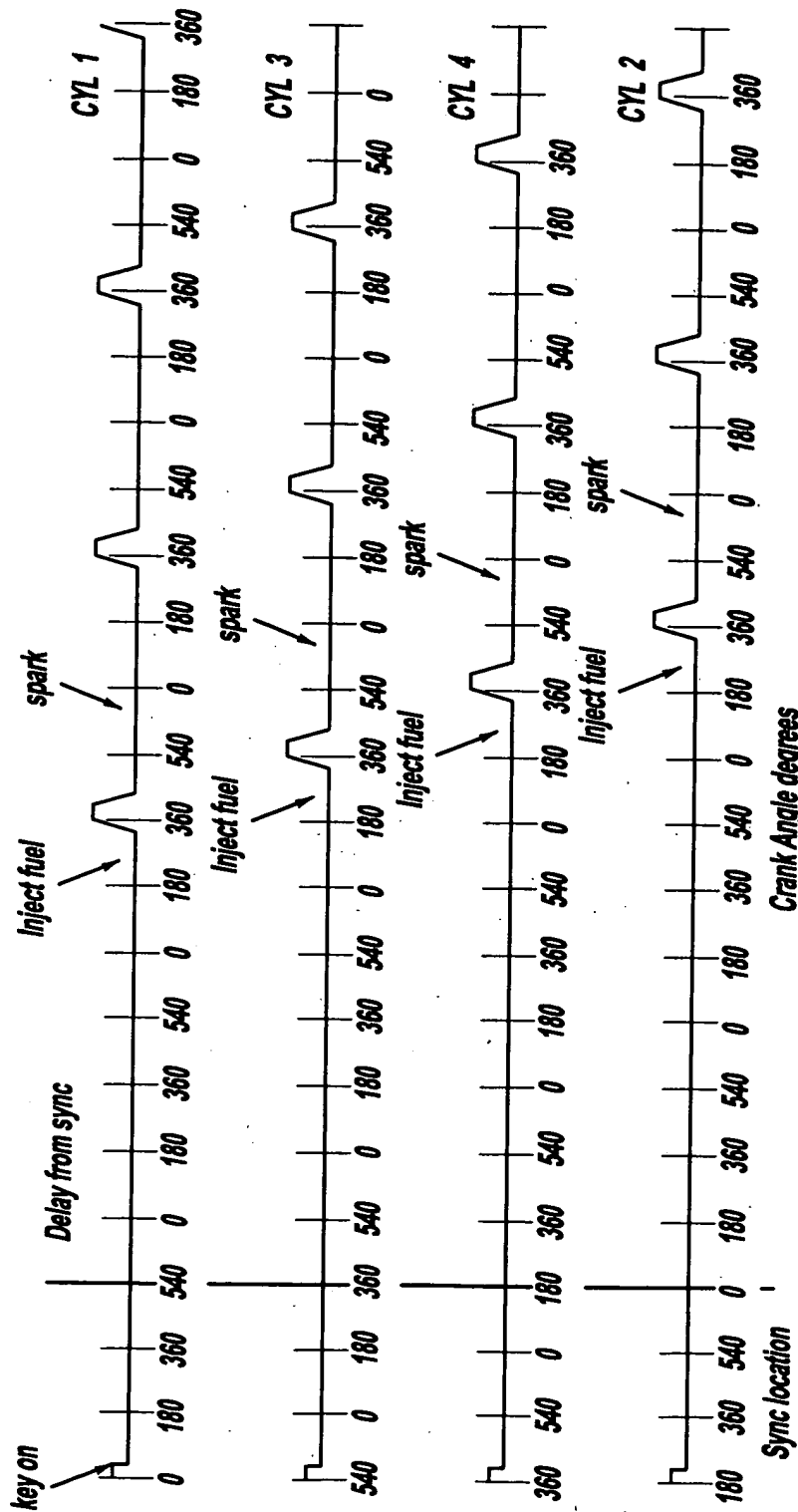
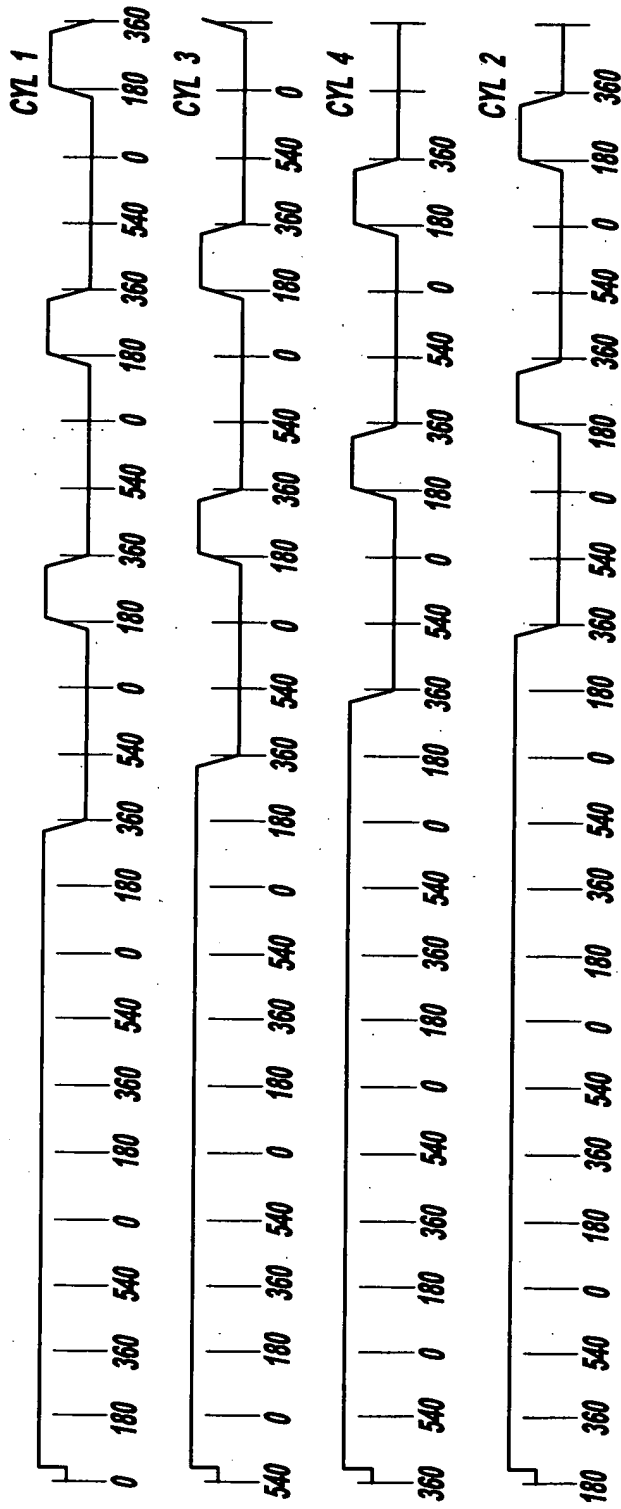


FIG - 53a



Cylinder piston position cyl 1 & 4

Cylinders 2 & 3

FIG - 53b

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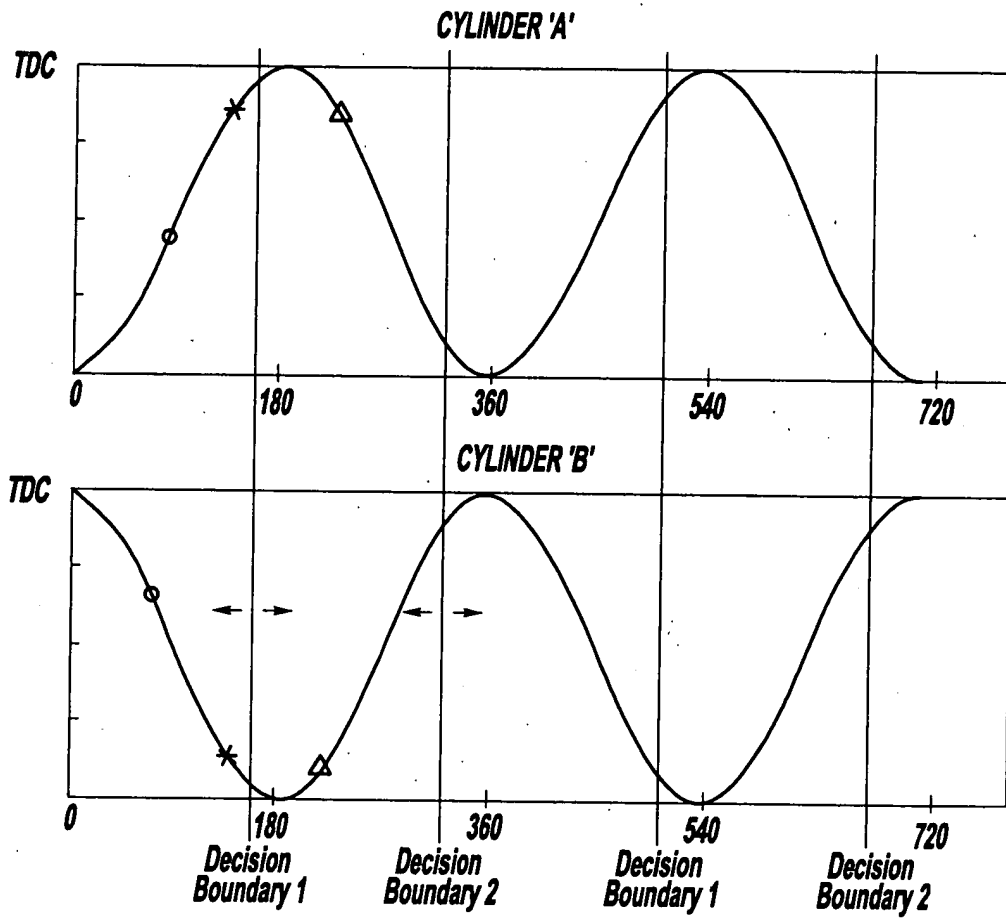
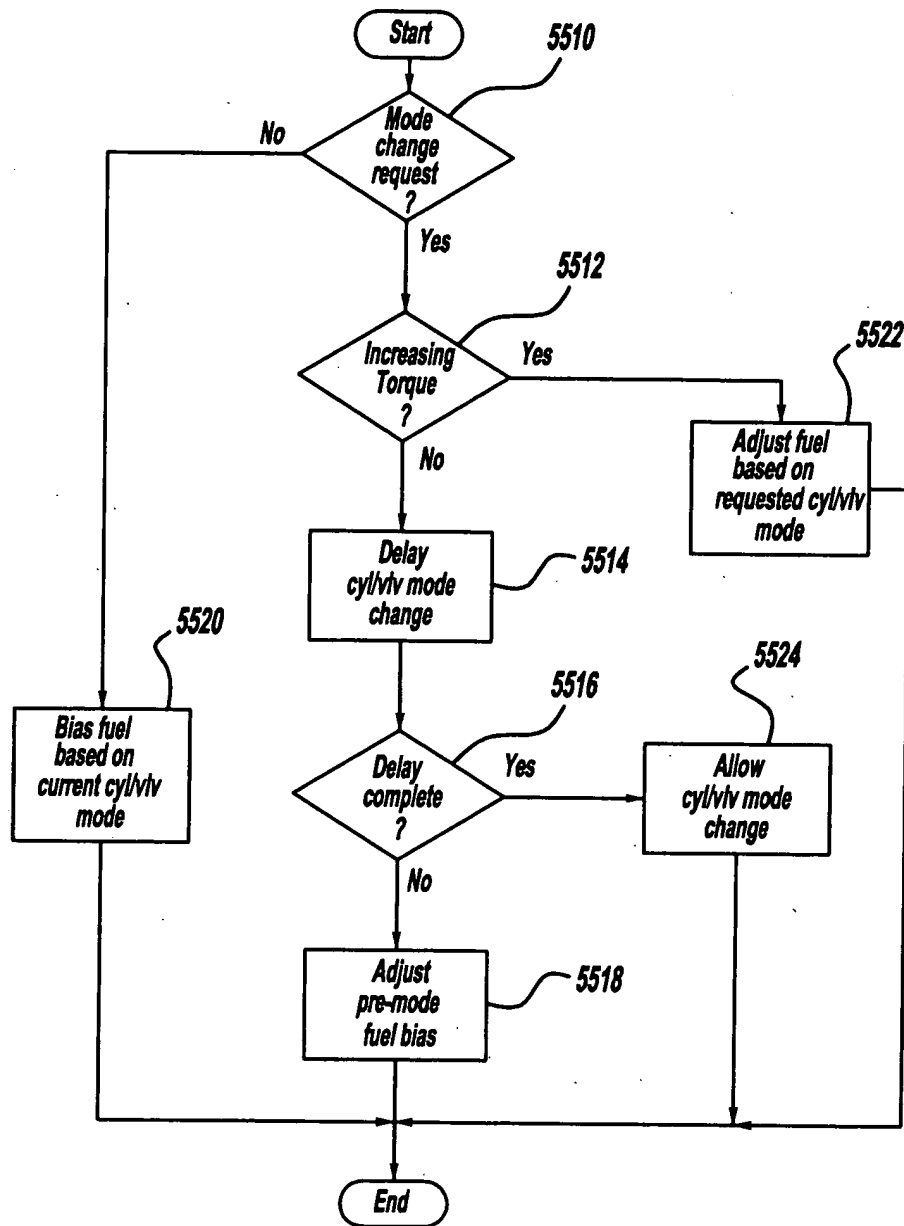


FIG - 54

**FIG - 55**